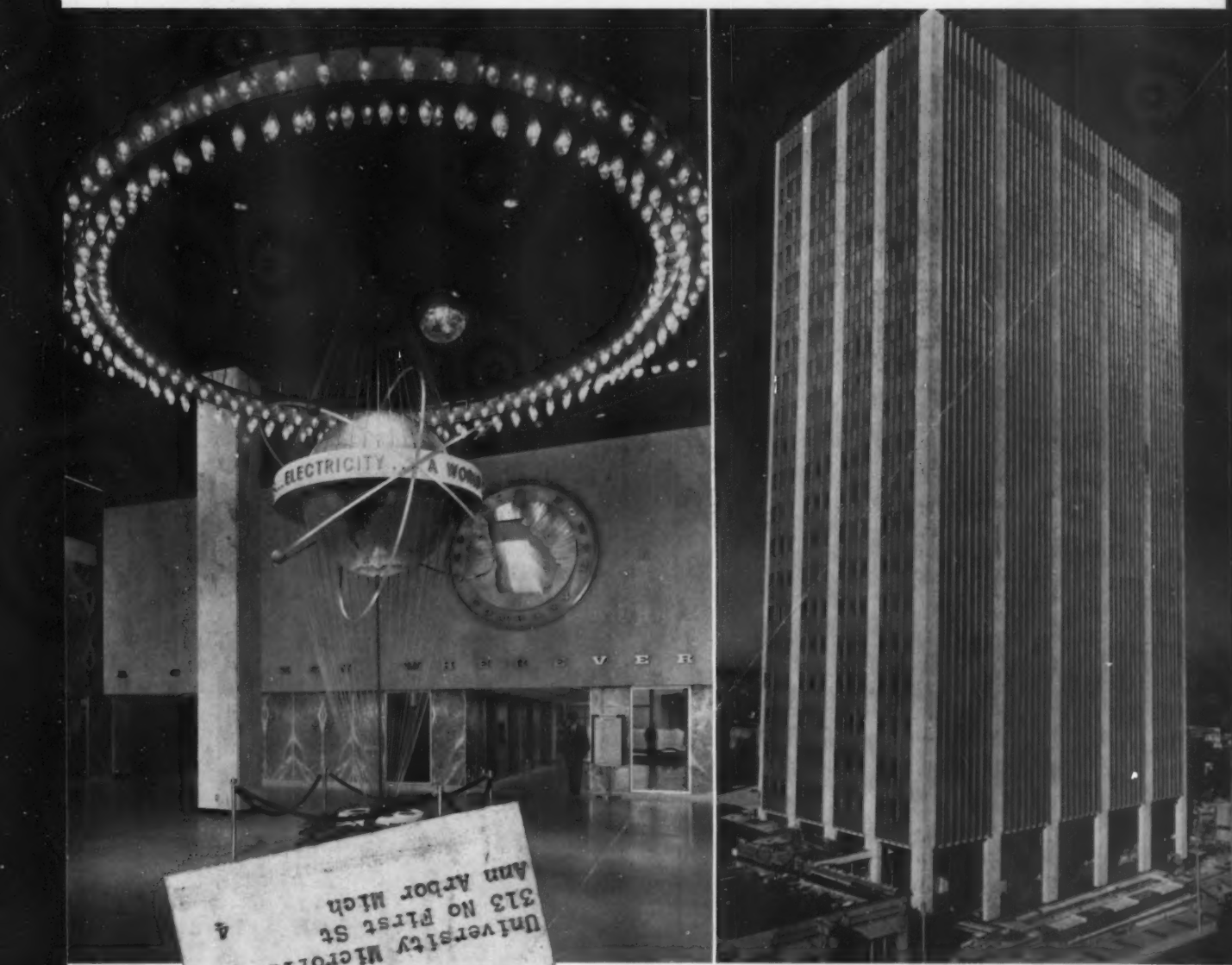
March 1961

Electrical South

a W.R.C. Smith Publication



University Microfilms
313 No First St
Ann Arbor Mich
4

Ge ing features electric heat and lighting levels up to 200 footcandles.

Also in this issue:

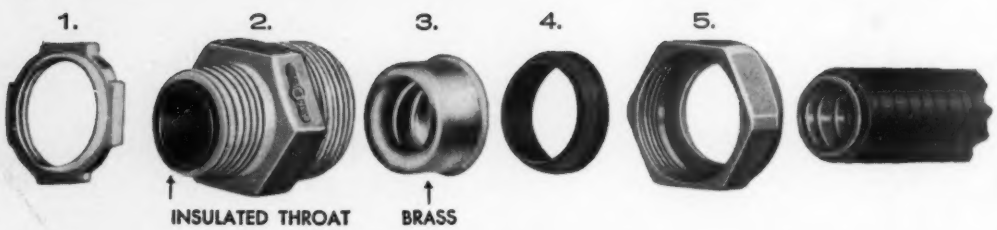
New encapsulated distribution transformers introduced

All-electric house utilizes more than 100 motors

Utility engineering section begins on page 63

BEST NEWS YET IN LIQUID-TITE CONNECTORS

Gedney insulated throat for top protection, easier pull-through



MALLEABLE IRON

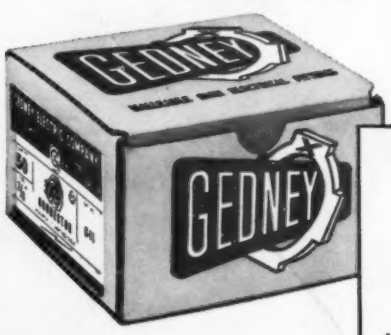
Now you can order Gedney Liquid-Tite Connectors with the added protection of insulated throats. You get faster, easier pull-through . . . eliminate dangerous wire fraying. Gedney Liquid-Tite Connectors are the finest, most efficient connectors available for use with liquid-tite conduits. They're precision-made from top grade malleable iron . . . designed to give lifetime dependable service in oil- and water-tight flexible raceways.

"Gedney Liquid-Tite Connectors are supplied in standard sizes from 3/8" to 4" straight; from 3/8" to 2" . . . 45° or 90° . . . with or without insulated throats. BE SURE . . . SPECIFY GEDNEY."

As shown from left to right in illustration, Gedney Liquid-Tite Connectors consist of:

1. Locknut — nut stock steel — cadmium-plated.
2. Main fitting — straight, 45° or 90° angle — malleable iron — cadmium-plated. Insulated throat — optional.
3. Grounding brass bushing — 1 piece — threaded to engage spiral of all type conduits.
4. Molded Vinylite sealing ring — pliable — ever-lasting.
5. Gland nut — malleable iron — cadmium-plated.

GEDNEY FITTINGS FIT



GEDNEY
ELECTRIC COMPANY

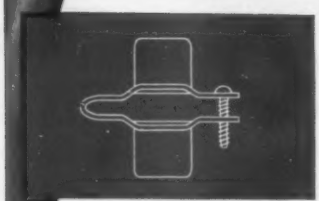
GEDNEY

AMERICAS BLDG. • RADIO CITY • NEW YORK 20
Foundry, Factory and Shipping Point: Terryville, Conn.

ANOTHER CAROL FIRST!

RANGE and DRYER CORDS

Featuring "Flush-Fit" Molded-on Plug



NEW COMPACT DESIGN! Special Carol molded-on plug only one-half the size and weight of ordinary types . . . fits flush against receptacle.

NEW FLAT CORD! Parallel conductors . . . more flexible, easier to install than ordinary cords. Attractive, modern gray color.

NEW ADJUSTABLE STRAIN RELIEF! Fastens cable securely to outlet box. 2-way locking design.

NEW EXCLUSIVE PACKAGING! "See-Thru" vinyl bags replace ordinary sleeve-packaging . . . cleaner, easier to stock . . . make eye-catching merchandising display.

Cords also available in sturdy, reshipper cartons. All specifications—part number, gauges, ratings, length—on both types of package. Gauges also stamped on terminals for clear identification after unpacking.

Available in full range of sizes and ratings.
Order now...and *SEE* the difference in sales!

When you call for cable, call for.....

Carol®

CAROL CABLE COMPANY
Division of [illegible] Company, Inc., Pawtucket, Rhode Island

FREE 28 PAGE CABLE TRAY CATALOG

Completely illustrated with full data and specifications on:

GLOBETRAY . . . the Superior Ladder type tray.

CABLE-STRUT . . . the Superior Basket type tray.

(Interchangeable at any point in the system.)

A must for architects, consulting engineers, and designers interested in trays for the support of cables, wiring and tubing used for power and communication instrumentation, where speedier installation is desired. A full line of accessories is available.

Write for your copy TODAY.

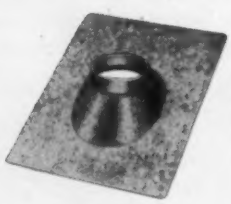
PRODUCTS DIVISION THE GLOBE CO.
4154 S. Princeton Ave. Chicago 9, Illinois

EVANS ROOF FLANGES

Electrical Contractors and Electricians Are Taking Advantage of A New Evans Product to Build Mast Type Electrical Entrances.

Evans Roof Flanges provide lifelong leakproof protection and meet any building specification. A choice of three metals—galvanized, aluminum, and cast lead are manufactured to meet every requirement.

You'll find Evans Roof Flanges economical to use. Contact your Wholesale electrical supply jobber today.



EVANS METAL COMPANY

P. O. Box 13168
Station K
Atlanta 24, Ga.

Business staff

FRANK P. BELL, *Business Manager*

J. A. MOODY, *Production Manager*

H. REDFERN HOLLINS, *Director Market Research*

JAMES G. DENTON, *Subscription Manager*

Business representatives

New York:
WARREN V. SMITH, 41 Russell Rd., Fanwood, N. J. Tel. FAnwood 2-9292.

Upper New York:
J. D. PARSONS, 39 Atlantic Ave., Cohasset, Mass. Tel. EVergreen 3-0712.

Cleveland:
W. G. SHEEHAN, 17021 Amber Dr., Cleveland 11, Ohio. Tel. WInton 1-1306.

Chicago:
ROBERT A. BLUM, 333 No. Michigan Ave., Chicago 1, Ill. Tel. CEntral 6-6964.

Los Angeles:
WARREN R. CHRISTIAN, 4140 Edenhurst Ave., Los Angeles 39, Calif., Tel. NOrmandy 1-7457. Answering Service: HOllywood 2-1133.

San Francisco:
FRED JAMESON, 821 Edinburgh St., San Mateo, Calif., Tel. Diamond 3-8806.

Charlotte:
W. C. RUTLAND, P. O. Box 102, Gastonia, N. C. Tel. UNiversity 7-7995.

Dallas:
BARON CREAGER, BOB KING, 6131 Luther Lane Suite 208, Dallas 25, Texas. Tel. FLeetwood 7-2937.

Published Monthly by

W. R. C. SMITH PUBLISHING COMPANY

Editorial and Business Offices
806 Peachtree Street, N. E.
Atlanta 8, Georgia
Tel. TRinity 4-4462

W. J. ROOKE, *Chairman of the Board*
RICHARD P. SMITH, *President and Treasurer*
FRANK P. BELL, *Vice-President*
JOHN C. COOK, *Vice-President*
E. W. O'BRIEN, *Vice-President*
A. F. ROBERTS, *Vice-President*
A. E. C. SMITH, *Vice-President*
SEBA J. JONES, *Secretary*

Publishers also of

SOUTHERN POWER & INDUSTRY — SOUTHERN FARM EQUIPMENT
SOUTHERN AUTOMOTIVE JOURNAL — SOUTHERN BUILDING SUPPLIES
SOUTHERN HARDWARE — LIGHTING — TEXTILE INDUSTRIES

ANNUAL SUBSCRIPTION—$1.50; OUTSIDE USA—$10.00

ELECTRICAL SOUTH is published monthly at 116 E. Crawford Street, Dalton, Georgia by W. R. C. Smith Publishing Company. Executive and Editorial Offices: 806 Peachtree Street, N. E. Atlanta 8, Georgia. Second-class postage paid at Dalton, Georgia. Postmaster, send notices by Form 3579 to 806 Peachtree St., N.E., Atlanta 8, Ga.

Electrical South

Vol. 41, No. 3 **March 1961**

Contents

Imaginative lighting amplifies appeal of motel 40

Don't type it — tape record it instead 43
By Fred W. Goette, III, Stewart-Goette Electric Co.

Contractor expedites printing plant's move 44
By Romeo Catilena, Maisel Electric Co., Inc.

Good living stressed by Indoor Comfort, Inc. 46

All-electric house has 100 motors 48

Application of quartz iodine lamps 50
By Logan VanLeigh, Field Engineer, Appleton Electric Co.

Utility engineering

Utility engineering section 63

Encapsulated distribution transformers introduced 76

Comment on meter construction 79
By Nick Newton, Arkansas Power & Light Co.

New look at basic impulse levels 80
By H. H. Strozier, Assistant Chief Planning Engineer, Georgia Power Co.

Newly designed 13.8-kv switchgear 84

AIEE meeting hears T&D problems 86

In every issue

Economic comment 6
By Dr. J. Whitney Bunting

Washington Report 10
By Jack James

Catalogs and bulletins 12

Postage-paid inquiry card 17

Contractors tell how 54

Understanding the Code 58
By Walter R. Stone

New electric utility products 94

Estimating data sheets 102

Know the law 107
By Arthur L. H. Street

News of the industry 108

Dates ahead 112

News about people 113

New electrical products 116

Technical books 124

Helpful literature from manufacturers 125

Copyright 1961, W. R. C. Smith Publishing Co., Atlanta, Georgia

Editorial staff

CARL W. EVANS, *Editor*

WILLIAM B. WHITE, *Associate Editor*

JO ANN PARKER, *Assistant Editor*

CAROLYN WASHBURN, *Assistant Editor*
Directory Issue

BOB KING, *Southwestern Editor*
(P. O. Box 28275, Dallas 28, Texas)

Contributing editors

DR. J. WHITNEY BUNTING ..... *Economics*

JACK JAMES ..... *Washington News*

WALTER R. STONE ..... *Code*

ARTHUR L. H. STREET ..... *Law*

Field editors

BILL ABBOTT ..... *Tampa, Fla.*

HURLEY E. BADDERS ..... *Greenville, S. C.*

BILL G. COX ..... *Amarillo, Texas*

S. W. ELLIS ..... *Little Rock, Ark.*

WENDELL O. GIVENS ..... *Birmingham, Ala.*

ROSS L. HOLMAN ..... *Nashville, Tenn.*

L. H. HOUCK ..... *Jefferson City, Mo.*

RICHARD LANE ..... *Memphis, Tenn.*

OLEN J. LEBLANC ..... *Baton Rouge, La.*

W. M. MASSEY ..... *Jasper, Ala.*

W. U. McCOY ..... *Oklahoma City, Okla.*

RUEL McDANIEL ..... *Port Lavaca, Texas*

B. S. MILLER ..... *Washington, D. C.*

HARRY J. MILLER ..... *Sarasota, Fla.*

WARNER OGDEN ..... *Knoxville, Tenn.*

C. SCOTT THOMAS ..... *El Paso, Texas*

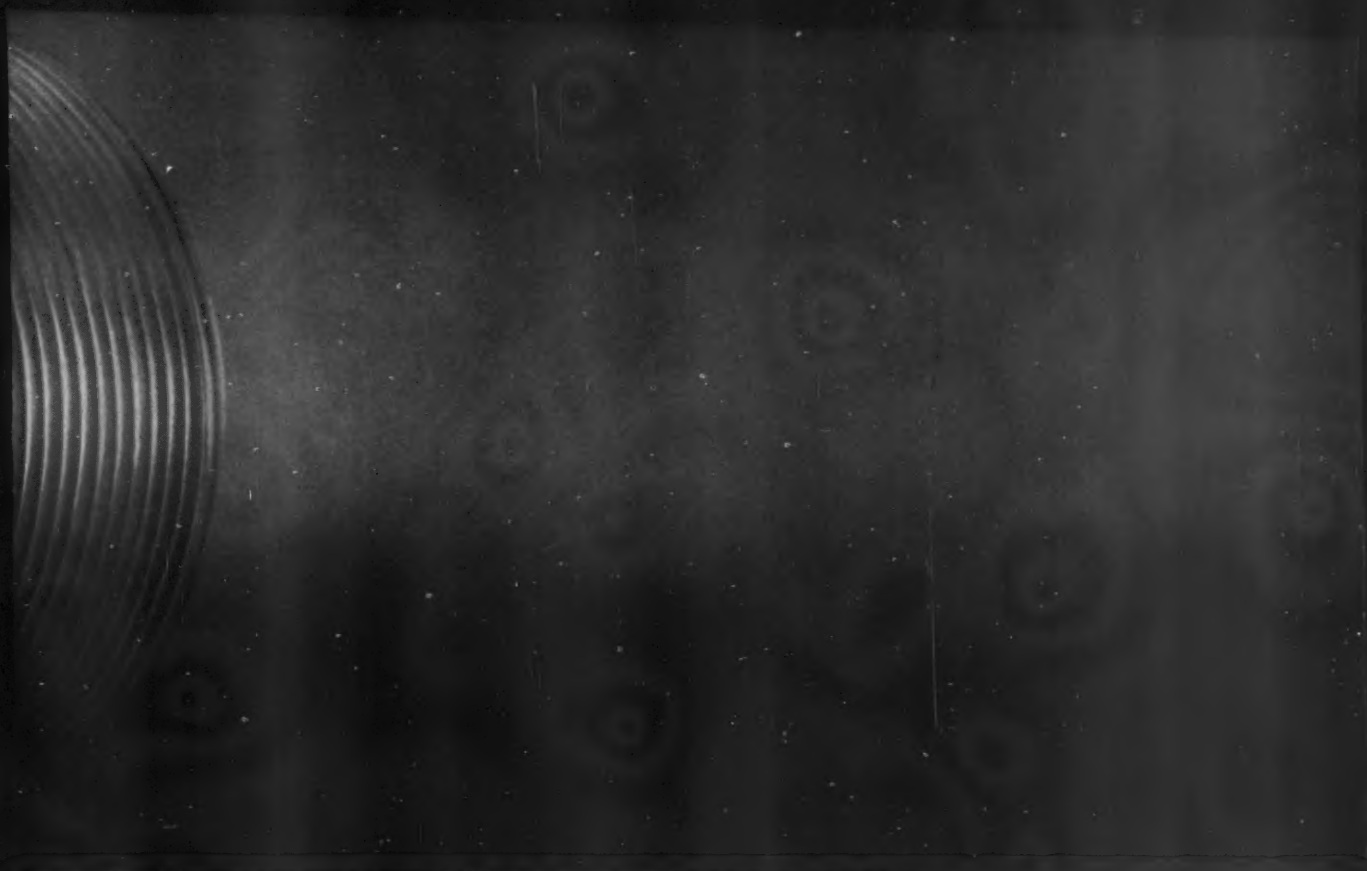
ERNEST WATSON ..... *Jackson, Miss.*

FRONT COVER—Georgia Power's new 22-story downtown Atlanta building exemplifies the latest commercial application of high level illumination which also heats the building. Abe Feder designed the spectacular lighting for the lobby.

INTRODUCING KAISER ALUMINUM

KINGFISHER

RIGID ALUMINUM CONDUIT



*AMAZING K-40 SILICONE LINING CUTS FISHING WORK IN HALF!

New Kaiser Aluminum Kingfisher Conduit—with exclusive lining of clear, glassy-hard K-40 Silicone—lets cables slip through with 39 to 61 per cent less pull! (Actual tests with steel and other aluminum conduit.)

Keep bids low—two ways! First, with aluminum's light weight, you reduce man-hours for handling and installation as much as 35 per cent. And second—because Kingfisher's new lining saves you extra man-hours during cable-pulling, your total labor cost is reduced even more! Result: more successful bids for you!

Ask for Kaiser Kingfisher by name. Kaiser Kingfisher Conduit is made only by Kaiser Aluminum—of quality-controlled alloy for high strength, easy working. Corrosion resistant, even in concrete! Only Kaiser Kingfisher offers all the advantages of aluminum plus the new K-40 Silicone lining that cuts fishing work in half!

NOW AVAILABLE—COMPETITIVELY PRICED Your Kaiser Aluminum Electrical Distributor has Kingfisher Aluminum Conduit. Call him.

KAISER ALUMINUM*

NEW LEADERSHIP IN THE WORLD OF ALUMINUM

*Trademark Kaiser Aluminum & Chemical Corp.

See HONG KONG and MAVERICK weekly on the ABC-TV Network

Economic comment

by J. Whitney Bunting, Ph.D.
Contributing Economics Editor

Southern economic notes

Contrary to normal expectations, the Southern area is now showing how its agriculture can soften the blow of a recession.

Although there has been a decline in manufacturing production in this area, as in other sections of the nation, agricultural production maintained the same relative pace in 1960 as it did in 1959.

Practically all of the South's growing crops performed well during the past year and, if the same success can be obtained this year, it may be farming that keeps the economic scene bright for this region. This is a far cry from the reports of a few years ago that wrote off Southern agriculture as a dwindling part of the income picture and pointed to manufacturing as the salvation of the economy.

In all probability, agriculture on a more businesslike basis will continue to be a strong factor in the diversified economy of the South.

One of the principal reasons for the manufacturing and industrial difficulties of this area is the continued trend of many farm people to leave the rural areas to seek greater financial returns in the cities. This has been a trend that has been going on for many years and shows no possibility of decline at this time.

The number of farms has been steadily decreasing; the average size has been increasing; the number of people employed has been decreasing; the mechanization of the farm operation and the application of business-type operations have been increasing. Each of the above factors has tended to produce greater financial strength in the farm unit and has reduced the number of marginal and submarginal operations.

As long as efficiency in management and operation of the farm unit can spell the difference between success or failure, there will be a continued increase in better farm technology in the Southern region.

The move of farm workers and their families to the cities, however, has not been a blessing to all concerned. The slightly depressed non-farm picture has limited the number of job opportunities in the urban areas, and thus there is increased unemployment in some of the strong production centers. It is unfortunate that this happens at this precise time because it magnifies the severity of the problem far beyond proper and accurate proportions.

Statistical reports tend to show totals of unemployment rather than breakdowns as to the cause of the situation. Thus, the picture presented publicly might indicate a far heavier loss of industrial jobs than is the true case. Incidentally, this situation is not as prevalent in other sections of the country where the movement of farm labor to city environment is not as pronounced.

So those who might be led to believe that recession has struck deep into the Southern economy should review unemployment statistics to weigh the factors responsible.

One other strengthening factor in the Southern economy is the rate of consumer spending as reflected by the most recent statistics of retail sales. Unlike other areas of the United States, these figures in the South showed a continued increase which is all the more remarkable since this conflicts with the national pattern.

Consumer confidence cannot be underestimated as a supporting or detracting element in the state of business affairs. The stimulant that strong consumer spending can provide to the economy of the South may well serve as an example to the people of the nation for this reflects confidence in a rather prompt upturn of economic activity.

Moreover, retail sales are generally up in this region with only a few soft spots that might cause later worry.

Anti-recession agitation

The many and varied statements issued by the new Administration in Washington have often been more troublesome than accurate, particularly in reference to economic conditions. There is ample reason to believe that the announcements as to the deplorable state of economic affairs and the frequent references to recession or depression conditions have hurt, rather than helped, the economy.

Previously, the Federal government has noted and recognized that in spite of prosperous conditions for the nation as a whole, there were many weak spots, but these were geographically localized for the most part.

Certain areas stressed

Heavy unemployment figures were available in certain areas of Michigan, Pennsylvania, Connecticut, West Virginia, and other regions, but for the most part these were offset by continued strength in the major portion of the nation. By continued reference to these depressed areas and by inference that similar conditions were rapidly moving to all sections of the country, the Kennedy Administration may hope to get strong public support for some of their economic measures.

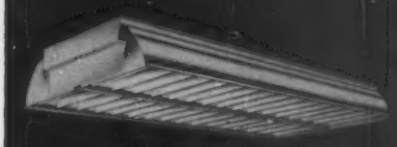
Public works, minimum wage, medical care for the aged, and other proposals might be more acceptable to Congress and to the people as a whole if presented, not on their own merits, but largely under a backdrop of anti-recession measures.

This is undoubtedly political, but it is unfortunate that it becomes necessary to utilize human discomforts as the steppingstone for the passage of legislation that might have difficult going under its own merit.

There is no doubt but that there are many recession type signs in the air today, but for the past eight years they have been met with firm determination to lift the economy upward by accent on non-governmental measures. The public was not treated to a barrage of "scare" measures but rather to cautious optimism which encouraged producers to produce and consumers to buy.

(Continued on page 134)

Lighting BY miller



ALUMINUM TROFFER FOR POWER GROOVE

General Office Area, Public Service Company of Indiana, Connersville, lighted with Miller Aluminum troffers for Power Groove—125 footcandles maintained. Architect and General Contractor, Huber, Hunt and Nichols, Indianapolis.

LIGHTING BY miller SINCE 1844

Miller POWER GROOVE Lighting for Renovation and New Building Projects . . . this office is typical of many where Miller Aluminum troffers teamed with Power Groove Lamps are providing *comfortable*, high footcandle lighting at *lower cost* than ever before possible.

Designed especially for Power Groove, these Aluminum troffers are among a group of important fixtures recently introduced by Miller. Shown below are some other recent additions. For example, the Richmond for Power Groove . . . particularly suitable for lighting stores and public buildings.

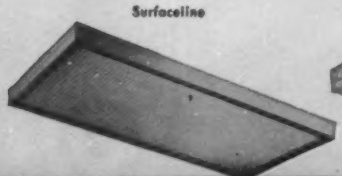
Whatever the interior—Office, Store, School, Factory or Public Building—there's a Miller fixture to meet your needs . . . for use with the fluorescent lamp type of your choice.

For further information on Miller Power Groove Lighting, or help with a specific lighting job or fixture write Dept. 261, or contact your Miller Representative.

THE **miller** COMPANY, MERIDEN, CONN. • UTICA, OHIO

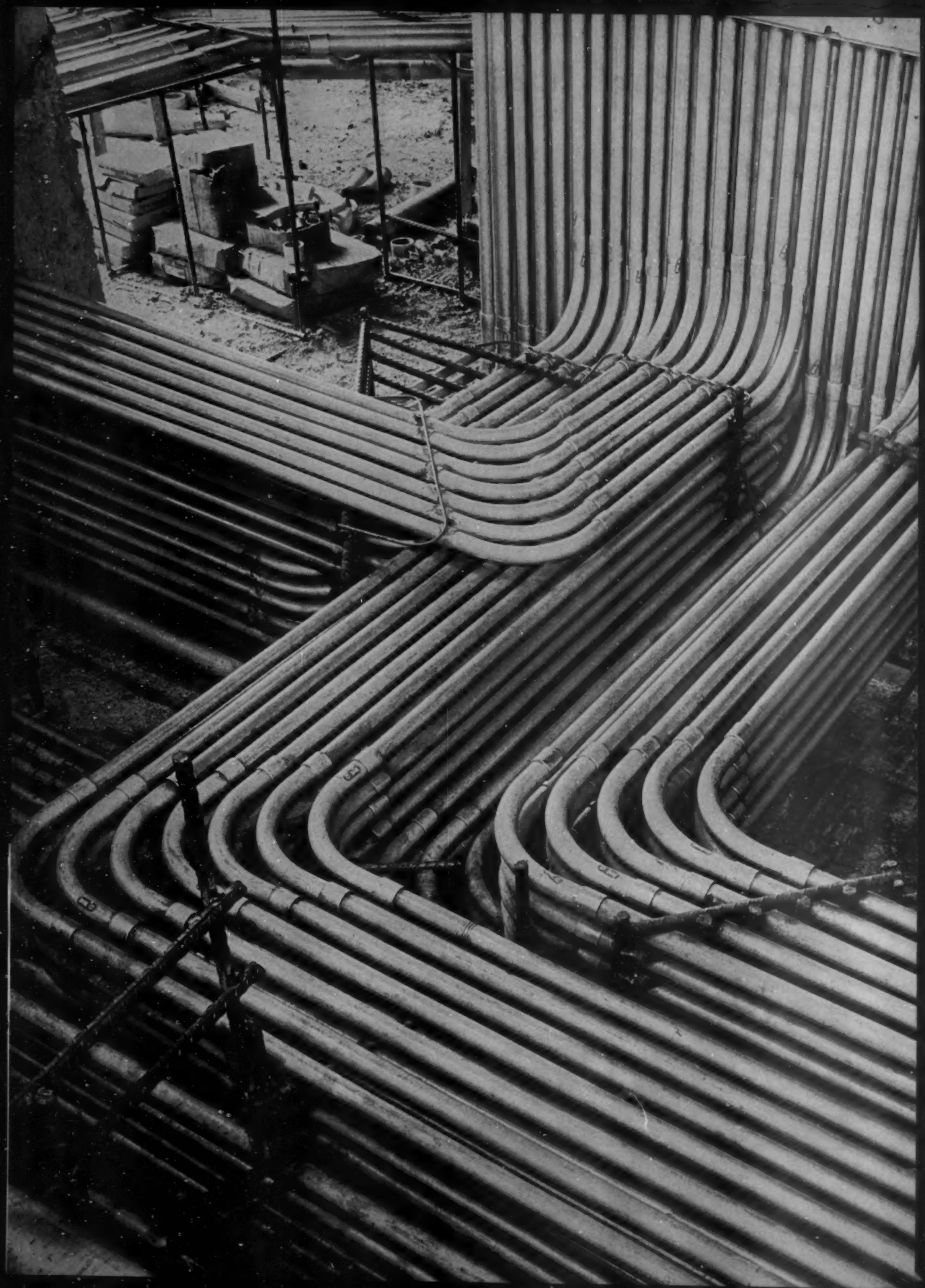
Versaline Troffer

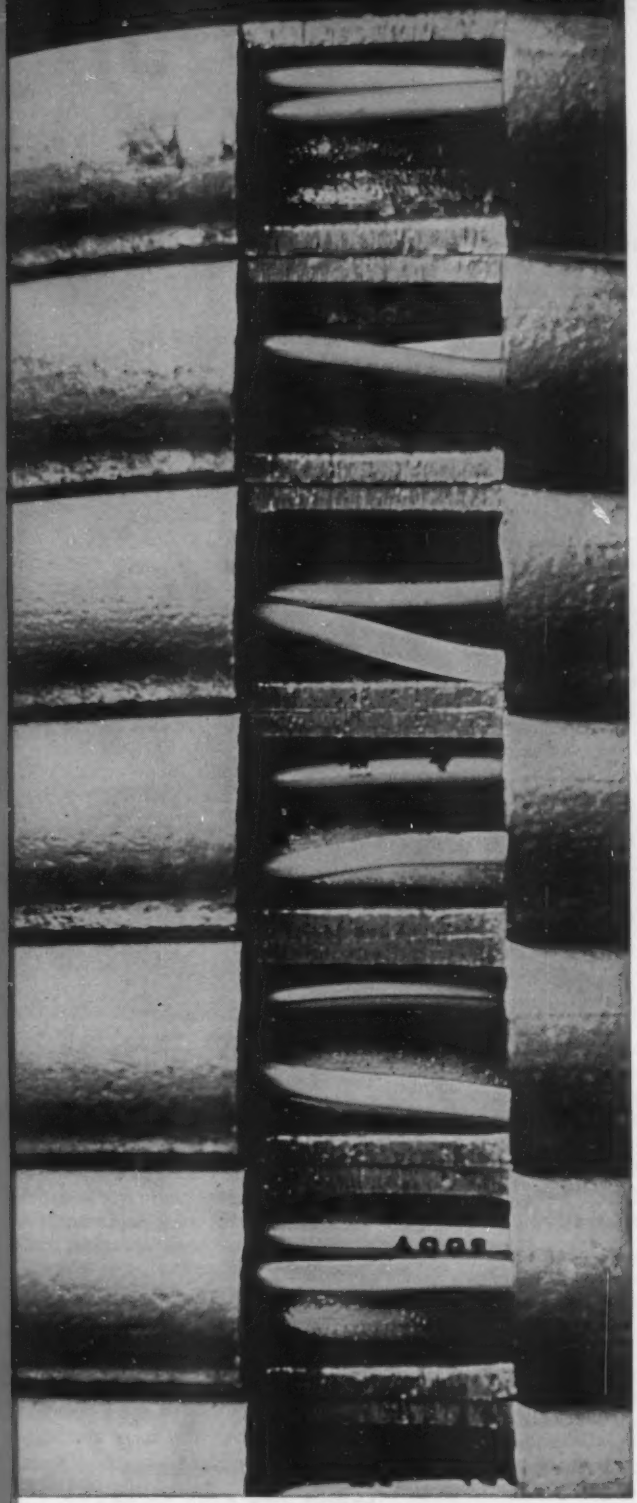
Surfaceline



Richmond for Power Groove

Sabre





BENDS

Youngstown steel conduit offers greater bendability for modern electrical raceway construction

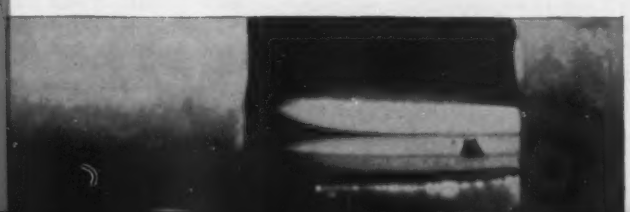
You can turn the hard corners. Twist. Bend again. Meet impossible raceway demands with Buckeye and Yoloy rigid steel conduit by Youngstown. It is easier to work with. It is easier to bend where you want it . . . without flattening, without creasing, without cracking its tough elastic finish. With Youngstown conduit you get the smoothest raceway possible for easy wire pulling.

Sizes: ½" to 4" available in Youngstown continuous weld pipe, 5" to 6" sizes in Youngstown standard weight seamless pipe. All are products of modern, integrated facilities where Youngstown carefully controls quality from ore to mill to final automatic bundling.

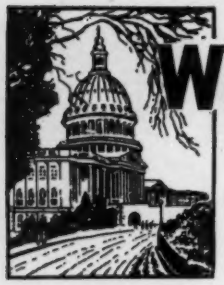
Get Buckeye from your Youngstown Distributor if your job is typical. Ask for Yoloy if specs call for greater corrosion resistance.

Get conduit from the world's largest producer of rigid steel conduit: Youngstown.

Youngstown – growing force in steel



For full details on Buckeye and Yoloy Conduit write to: Dept. J-31.
The Youngstown Sheet and Tube Company, Youngstown, Ohio



Washington report

By Jack James

Digest of Washington news of special significance to the electrical industry

Expenditures hit record for maintenance, repairs

EXPENDITURES for maintenance and repairs hit a record high in 1959, the U.S. Department of Commerce reports.

Figures just released by the Department show that $19.3 billion was spent that year on maintenance and repairs. This compares with $12.1 billion spent in 1950.

In every year but 1956 the expenditures have climbed, the Department said. Of the $19.3 billion, $7.5 billion was spent on homes, apartments, and other residences, and $4.2 billion on nonresidential buildings like stores and offices.

Maintenance and repair expenditures in 1959 were a little under one-third the expenditures on new construction in that year.

Severe winter storms affect housing starts

SEVERE WINTER snow storms and cold weather caused a moderate drop in housing starts in the South in January and December, the Census Bureau reports.

But the South fared somewhat better than the country as a whole. On the average, across the nation, January housing starts were four per cent below those of the preceding year. December starts were 30 per cent lower.

Chief of urban renewal sees decade of growth

THE CHIEF of the Federal Urban Renewal Administration predicted that the program would expand, erecting during this decade $40 to $50 billion in urban renewal projects.

Up to now the ten-year-old urban renewal program has produced little results, finishing only a small fraction (about one-twentieth) of the projects started.

Opponents of Federal programs say that the government has razed much but built little and with all its empty acres is now the biggest grower of ragweed in the nation.

Leonard J. Czarnecki, URA director, said that project requirements have now been made less rigid to permit faster action. "There is no reason," he said, "why the urban renewal program in this country, with close cooperation of government and the area, won't get really rolling . . . . "

Contracting supervisors can't hold union offices

THE NATIONAL LABOR Relations Board at Washington has been upheld by a Federal court in an order forbidding five building contracting firms in Detroit from letting their supervisors hold union offices. The court said, however, that it was legal for supervisors to be union members.

Reason for the ruling was that union members might fear to speak up at union meetings against officers who the next day, as supervisors, could punish them.

What does guarantee on equipment signify?

WHEN A SUPPLIER guarantees the equipment he sells you, do you know just what the guarantee means?

The Federal Trade Commission at Washington is convinced that buyers would do better if they would ask more questions. Here are seven pre-sale questions the FTC says you should ask:

(1) Who makes the guarantee, the supplier or the manufacturer?

(2) Does the product have to be returned or will it be repaired where it is installed?

(3) Is the entire product guaranteed or just certain parts?

(4) Who pays the labor charges involved in product repair?

(5) Does the guarantee cover routine servicing?

(6) Is the guarantee based on the price that you pay for the product or the manufacturer's price to the supplier?

(7) Is the guarantee in writing?

Clearing up these questions in advance can mean the difference to you between a loss or a profit on a job because of failure of a part.

Employers can't coerce employees to join union

THE NATIONAL LABOR Relations Board at Washington ordered 15 Florida electrical contractors to stop coercing employees to join an independent union and to stop "participating as members, organizers, officers, directors," in the union. The board also ordered the union to dissolve itself.

The union was called United Southern Employees Association, Inc., Electrical Employees of Florida, U.S.E.A. Local No. 1. The complaint against the contractors was made by IBEW Local 349.

The contractors agreed to abide by the board's order although they did not admit that they had acted illegally.

Refusal to refer violates state's right-to-work law

THE SOUTH CAROLINA Supreme Court ruled that it was illegal for the Miller Electric Company to hire only persons referred by the IBEW. The Court said that an exclusive system like this violated the South Carolina right-to-work law.

The ruling cleared the way for Jess W. Branham to sue the Miller Electric Co.

Mr. Branham had worked for the company on a job in Lexington County. There was a strike, and though Mr. Branham was general foreman, he left the job. He did not participate in the strike. When he tried to return to work after the strike, the IBEW refused to refer him and Miller Electric refused to hire him.

Lack of understanding causes two-week strike

A LABOR DEPARTMENT fact finding committee said that the basic cause of a two-week strike by IBEW Local 756 and Pipefitters Local 295 against Dr. Wernher von Braun's Saturn missile space exploration program was failure of the government scientists and the

(Continued on page 134)

ARROW·HART

now offers you even greater

FLEXIBILITY

in 100 and 200 amp service equipment

AVAILABLE ONLY FROM AUTHORIZED ARROW-HART DISTRIBUTORS

* **NEW CP-215 and CPS-215 Four Circuit Fuse Blocks,** available only from ARROW-HART, may be used interchangeably with 100 amp or 200 amp ADD-ON Service Equipment . . . permitting easy installation of additional branch circuits in place of 30 amp or 60 amp pullouts. *Will not unbalance loads. 4 circuit blocks have opposite polarity and are ideally suited for electric heat installations — saving wiring time and materials.* Available with Type "S" 15 amp safety adapter rings.

VERSATILITY is a built-in advantage of ARROW-HART 100-200 amp ADD-ON Service Equipment. Now you can meet your customers' present *and* future electrical needs with one unit that allows easy installation of additional pullouts and branch circuits as they are required. *Contractors tell us that — once this "ADD-ON" feature is explained to a customer — it means a sure sale.*

FULL-LINE INTERCHANGEABILITY of ADD-ON components provides a single series of units for both 100 amp and 200 amp equipment. For example, the 200 amp service unit shown above is factory assembled with one 200 amp hinged pullout, two 60 amp pullouts, two 30 amp pullouts and 12 fused branch circuits. Whenever needed, you can add one or two 30 or 60 amp pullouts, plus two or four branch circuits. Or, by using the new CP-215 fuse block in place of pullouts, a total of 12 fused branch circuits can be added. These same components also give the 100 amp equipment similar flexibility. No other supplier currently offers such versatility in 100-200 amp service equipment.

ARROW-HART Type "S" Fuse Holders (CPS-15 and CPS-215) are supplied with built-in adapters for maximum safety — allow insertion of only 15 amp Type "S" fuses for areas where code requirements make this protection mandatory.

COMPLETE INFORMATION on these units is presented in the new booklet, "100-200 Amp ADD-ON Service Equipment." For your free copy, write to: Dept. ES, The Arrow-Hart & Hegeman Electric Co., 103 Hawthorn Street, Hartford 6, Connecticut.

ARROW AH HART

Quality since 1890

ENCLOSED SWITCHES • WIRING DEVICES
MOTOR CONTROLS • APPLIANCE SWITCHES

CATALOGS and BULLETINS

Available Free to Readers of Electrical South upon Request

GENERAL CATALOG — General catalog of Royal Electric Corporation, Pawtucket, R. I., covering flexible, service and lamp cords, cord sets, extensions, trouble lights, wiring devices and fuses is available to wholesalers. Dealers catalogs may be secured from Royal distributors.
Write in No. A101 on card, pg. 17

WIRING PRODUCTS — Various features of J&S Despard interchangeable wiring devices and detailed information covering this line are offered in a brochure released by Pass & Seymour, Inc., Dept. ES, Syracuse 9, N. Y. Included are such features as Camstrap for quick, easy installation, three-wire grounding, and pressure terminal devices.
Write in No. A102 on card, pg. 17

FLUORESCENT BALLASTS—Advance Transformer Co., 2950 N. Western Ave., Chicago 18, Ill., has recently completed the compilation and printing of a 20-page catalog on fluorescent ballasts and their use. Included are data sheets on available Advance ballasts and a comprehensive installation and operation section and testing procedures. Copies of the booklet are available on request.
Write in No. A103 on card, pg. 17

ELECTRICAL TAPES— Plymouth Rubber Co., Inc., Canton, Mass., is offering a new catalog on friction, rubber, and plastic tape. The full color folder gives descriptions, sizes, and packing information on their complete line of Slipknot electrical insulating tapes. Detailed specification data charts are included in the 6-page bulletin.
Write in No. A104 on card, pg. 17

UNDERFLOOR DUCT — Formerly known as Howarduct, the Spang Standard Underfloor Duct, is introduced by the Spang-Chalfant Division of the National Supply Co., Grant Bldg., Pittsburgh, Pa., in an eight-page, illustrated bulletin featuring its simplicity in the distribution systems for electric power, telephones, and inter-coms.
Write in No. A105 on card, pg. 17

ELECTRICAL BOXES—Steel City Electric Co., 1207 Columbus Ave., Pittsburgh 33, Pa., offers a catalog of their complete line.
Write in No. A106 on card, pg. 17

GUTH INDUSTRIAL LIGHTING BROCHURE — New 8 page, 4 color brochure by The Edwin F. Guth Company, 2615 Washington Blvd., St. Louis 3, Missouri, describes Guth KOLORKODED industrial lighting fixtures. This unique innovation of color coding luminaires opens a new field in industrial lighting. Folder includes photographs, lighting data, engineering information and complete descriptive data on KOLORKODED luminaires and standard RLM reflector units. Write for your free copy.
Write in No. A107 on card, pg. 17

SERVICE PANELS — Information on protective electric control centers for homes, apartment buildings, service stations, and industrial applications is contained in Bulletin PM-385, "BullDog Pushmatic Electric-Centers," issued by BullDog Electric Products Co., 7610 Jos Campau, Detroit, Mich.
Write in No. A108 on card, pg. 17

AERIAL CABLES — A 32-page booklet from Southern Electric Co., P. O. Box 989, Chattanooga, Tenn., explains how Compresto Cables and PLM Products, "Wrap Around" spacers can be combined in a compact spaced aerial cable system. Design, voltage drop, sag and tension, and short circuit current are also covered.
Write in No. A109 on card, pg. 17

FITTINGS AND FIXTURES—Information relative to explosion-proof fittings, fixtures, plugs and receptacles, and accessories is available in a 50-page book illustrating the complete line of these products manufactured by Killark Electric Mfg. Co., Easton and Vandeventer Ave., St. Louis 13, Mo.
Write in No. A110 on card, pg. 17

CONDUIT WIREHOLDERS — A new information sheet describing their line of all-purpose conduit wireholders is now available from Knox Porcelain Corp., P. O. Box 2031, Knoxville, Tenn. The illustrated sheet gives installation information, design features, and specifications.
Write in No. A111 on card, pg. 17

CONDUIT FITTINGS—A new 24-page catalog, illustrating a complete line of conduit fittings, oval bodies type LB, LL, LR, and T, and lighting parts is now available from Elliott Electric Mfg. Co., 50-30 98th St., Corona, N. Y.
Write in No. A112 on card, pg. 17

SATURABLE REACTORS — This efficient method of regulating and controlling electric power for various manufacturing processes is described in a new folder available from Sorgel Electric Co., 838 West National Ave., Milwaukee 4, Wisc.
Write in No. A113 on card, pg. 17

POWER SWITCHES—A new bulletin describing its Type PV power switches, is now available from Line Material Industries, Milwaukee 1, Wis. The bulletin gives complete information on switches rated at 600 or 1200 amperes and having voltage ratings from 7.5 kv to 69 kv.
Write in No. A114 on card, pg. 17

MOTOR STARTERS—Design and construction features of their automatic reduced voltage starters are described in a new bulletin released by Allis Chalmers, Milwaukee 1, Wis. Included is motor control engineered for centrifugal compressors, hammer mills, pumps, large conveyors, large fans, motor-generator sets, and other applications.
Write in No. A115 on card, pg. 17

HEAVY-DUTY WIRING—Illustrations and detailed descriptions of 27 types of Circle industrial and commercial wiring products are featured in a four-page folder available from Circle Wire & Cable Corp., 5500 Maspeth Ave., Maspeth, N. Y.
Write in No. A116 on card, pg. 17

CONDUIT FITTINGS — A new catalog describing their line of conduit fittings is now available from L. E. Mason Co., Boston 35, Mass. The illustrated, looseleaf-type folder contains information on design features, specifications, ordering, prices, and shipping.
Write in No. A117 on card, pg. 17

CATALOGS and BULLETINS

Available Free To Readers of

Electrical South

Upon Request

ELECTRICAL FITTINGS — A 40-page illustrated catalog and price list on the Gedney line. Shown and listed are conduit, threaded entrances, SEC, EMT and ground fittings and box connectors for both armored and non-metallic cables. Copies are available from Gedney Electric Co., RKO Bldg., Radio City, New York 20, N.Y.
Write in No. A118 on card, pg. 17

SWITCH & OUTLET BOXES AND ELECTRICAL FITTINGS— Catalogs B-960 and F-960 respectively feature the latest in switch and outlet boxes and electrical fittings. Completely illustrated, they contain over 100 pages of technical and informational data. A unique set of indexes in the fittings catalog make it the easiest reference catalog in its field. Available from the Electrical Fittings Corp., 37-50 57th St., Woodside 77, New York.
Write in No. A119 on card, pg. 17

STEEL WIRE—Technical information on Alumoweld, a newly developed aluminum-covered steel wire and strand, is contained in a 12-page catalog, just issued by the Wire and Cable Division of Copperweld Steel Co., 322 Frick Building, Pittsburgh 19, Pa. Illustrated and documented with engineering data, the colorful catalog provides a complete working knowledge of this new material—its properties, advantages, applications and construction practices.
Write in No. A120 on card, pg. 17

PRESSURE CONTACT SWITCH— An 8-page folder (101-K) and a 4-page folder (200-EK) are available from the Kelek Company, 59 Davis Avenue, Norwood, Mass., describing their Kam-Lok Pressure Contact Switch, open and enclosed models,

ARROW AH HART

POSITIVE PROTECTION with ARROW-HART GROUNDING Receptacles

with RIVETED Grounding Contacts and Terminals

5725
20 AMP.
125 VOLT
DOUBLE SIDE GRIP
ONE PIECE CONTACTS OF 1/32" THICK BRONZE
CONTACT RIVETED TO BASE PLATE WITH DOUBLE-HEAD BRASS RIVET

Available Only from ARROW-HART

SPECIFICATION GRADE

Now, positive grounding protection on commercial and industrial installations is assured with Arrow-Hart Grounding Receptacles built with *riveted* grounding contacts and terminals. The U-shaped double grounding contacts and terminals used in Arrow-Hart Specification Grade Grounding Receptacles feature a unique *one-piece construction of heavy 1/32" thick bronze – not brass.* This is mounted on the strap by a brass rivet, headed on both sides. *Exclusive with Arrow-Hart,* this rigid one-piece construction eliminates the possibility of loose joints and of parts turning in the grounding path . . . giving the operator dependable positive protection. Be *safe* – be *sure* – with Arrow-Hart's built-in quality and hidden values!

Complete information on ARROW-HART grounding devices is provided in the new booklet, "Grounding Facts". Write today for your free copy to: The Arrow-Hart & Hegeman Electric Co., Dept. ES, 103 Hawthorn Street, Hartford 6, Connecticut.

ARROW AH HART

Quality since 1890

WIRING DEVICES • ENCLOSED SWITCHES
APPLIANCE SWITCHES • MOTOR CONTROLS

respectively, for high-capacity use with current-limiting fuses for 250 and 480 volt service entrance applications from 1200 to 6000 amperes.

Write in No. A121 on card, pg. 17

WIRE PULLING LUBRICANT — Illustrated six-page folder showing the advantages of an improved Y-Er Eas wire pulling lubricant is available from Electro Compound Co., 4145 W. 150th St., Cleveland 11, Ohio.

Write in No. A122 on card, pg. 17

SELECTING FUSES — A 12-page descriptive handbook, Fuseology, tells how to get safest, most dependable, trouble-free electrical protection from fuses, Contains useful information on selecting right size and type of fuses —how to stop needless blows—avoiding poor contact and other troubles. Issued by Bussman Mfg. Co., University at Jefferson, St. Louis 7, Mo.

Write in No. A123 on card, pg. 17

CLAMPS AND STRAPS — Some 600 clamps and straps are listed in a new catalog put out by Victor Specialties, Inc., 775 Main St., New Rochelle, N. Y. Catalog number, size, type, and price are listed for each item in numerical order under general categories. Illustrations are also included.

Write in No. A124 on card, pg. 17

ELECTRICAL FITTINGS—Blackhawk Industries, Dubuque, Iowa, offers a complete catalog of electrical conduit and cable fittings. Also a special publication giving detail drawings and instructions for installing service entrance masts on low or ranch type buildings.

Write in No. A125 on card, pg. 17

LIGHTING PANELBOARDS — A 4-page descriptive folder featuring a line of plug fuse and toggle switch panelboards for lighting control circuits is now available from Frank Adam Electric Co., 3650 Windsor Pl., St. Louis, Mo. The folder includes box sizes, details of construction, wiring gutters, special features, and catalog numbers.

Write in No. A126 on card, pg. 17

ELECTRICAL ENCLOSURES — Catalog Number 6061 currently being offered to the trade by B & C Metal Stamping Co., 590 Means St., N. W., Atlanta 18, Georgia, is a well organized compact 132 page manual. The Catalog is divided into two distinct sections, one covering products for the Utilities, and the other section covering products for the Electrical Contractor. This Catalog offers complete descriptive information, prices, and specifications on all items in the B & C line of Electrical Products and Devices. Copies are available free of charge to Distributors, Contractors, Architects and Engineers, and Utilities.

Write in No. A127 on card, pg. 17

DISTRIBUTION EQUIPMENT — Kuhlman Electric Co., P. O. Box 288, Birmingham, Mich., offers an eight-page catalog, CS-201, describing their line of distribution transformers of the single phase conventional type, 167 kva and below. Also available is an information sheet, CS-204, on the Kuhlman externally operated series-multiple switch for pole-type transformers 5-167 kva.

Write in No. A128 on card, pg. 17

CABLE CONNECTORS — Tomic Sales and Engineering Co., 20000 Sherwood Ave., Detroit 34, Mich., now have available catalog sheets containing data on the complete line of their connectors, couplings, and cable connectors.

Write in No. A129 on card, pg. 17

LAMP GUIDES—Sylvania Lighting Products, 60 Boston St., Salem, Mass., has made available three lamp guides containing general information, technical data, and catalog listings on their lines of fluorescent lamps, incandescent lamps, and mercury lamps.

Write in No. A130 on card, pg. 17

ELECTRICAL ENCLOSURES — Adjustable and non-adjustable floor boxes, watertight outlets for floor use, and conduit hangers are shown in the 20-page revised catalog #750 available from Fullman Mfg. Co., Latrobe, Pa. Adjacent to each photograph in the catalog are specifications for the product pictured.

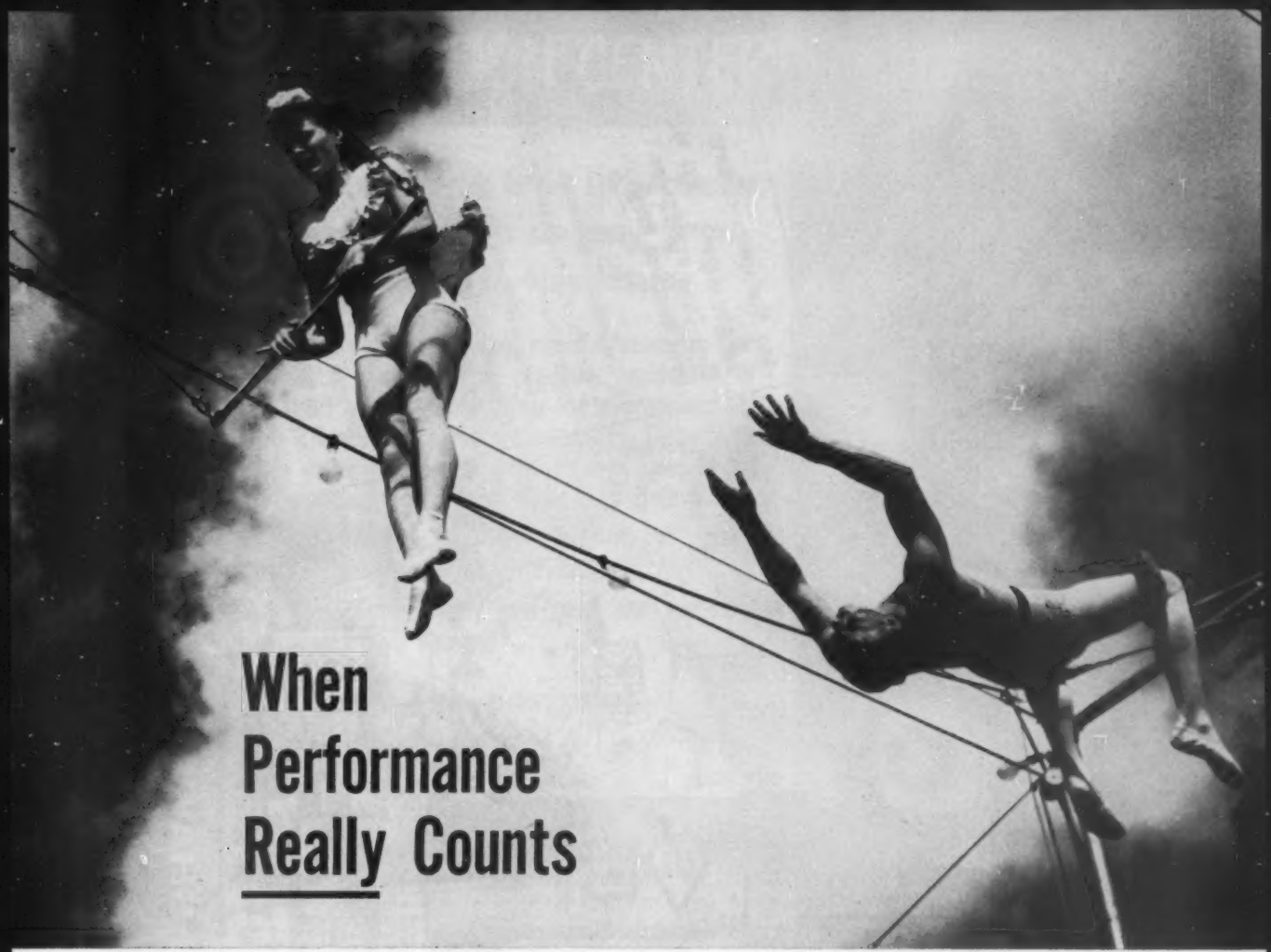
Write in No. A131 on card, pg. 17

ELECTRICAL TAPES—Eight-page Accurate Tape bulletin details data on rubber, friction and plastic tapes. Bulletin features laboratory test results, includes complete packaging information. Immediately available from Accurate Manufacturing Company, Garfield, New Jersey.

Write in No. A132 on card, pg. 17

PLUG-IN REELITE — Complete details about Appleton's lightweight, portable automatic Reelites are given in an attractive 4-page catalog insert. These devices find application in a wide range of occupancies: garages, loading docks, garment industry, construction crews, warehouses, machine shops, etc. Write to Appleton Electric Co., 1701 Wellington Ave., Chicago 13, Ill.

Write in No. A133 on card, pg. 17



When Performance Really Counts

• Southwire Galvanized Steel Strand

STRAND SIZE	5/8"	1/2"	7/16"	3/8"	5/16"	9/32"	1/4"	3/16"
WEIGHT PER 1000'	813 lb.	517 lb.	399 lb.	273 lb.	205 lb.	164 lb.	121 lb.	72.9 lb.
MINIMUM BREAKING STRENGTH IN POUNDS								
ASTM A-122-54T								
Galvanized (Single Galv.) Common	11600	7400	5700	4250	3200		1900	1150
Class A (Double Galv.) Common	11600	7400	5700	4250	3200		1900	1150
Class A (Double Galv.) Siemens-Martin	19100	12100	9350	6950	5350	4250	3150	1900
Class A (Double Galv.) High Strength	29600	18800	14500	10800	8000	6400	4750	2850
Class A (Double Galv.) Extra High-Strength		26900	20800	15400	11200	8950	6650	3990
Class A Utilities Grade, A.T.&T. and Western Union Spec.—7-wires		25000	18000	11500	6000*	4600		2400**
ASTM A-363-55T (No welds)								
Weldless High-Strength		18800	14500	10800	8000			
Weldless Extra High Strength		26900	20800	15400	11200			

*weight per 1000'—225 lbs. **weight per 1000'—80.3 lbs.

Trapeze artists defy death to please the crowd, but they never take chances with faulty equipment. Care beats dare by far.

So it is with Southwire Galvanized Steel Strand. Manufactured under stringent standards of quality control, it meets or exceeds applicable ASTM specifications . . . is preformed to eliminate flared ends when sheared. Quality extends even to reels which are premium non-returnable type. Comes in 250', *500', and 1,000' coils, and in 2,500', *5,000' and 5,280' reels. Special packaging to meet your requirements is available.

Specify Southwire Galvanized Steel Strand for ground, messenger and guying applications and be sure of quality.

Stock items

- Bare and Weatherproof Copper and Aluminum Line Wire
- Neoprene, Polyethylene, and VWP (Vinyl) Weatherproof Copper, Aluminum and Triplex
- U.R.C. (DBWP, TBWP) Copper
- Copperweld® Conductors
- Copper and Aluminum Building Wire
- ACSR and All Aluminum Cable
- Galvanized Steel Guy Strand and Static Wire
- Aluminized Steel Guy Strand and Static Wire
- Aluminum Alloy Wire
- Cable Accessories
- NM Sheathed Cable
- THW Building Wire

• ALSO FABRICATORS OF COPPER AND ALUMINUM FOR WIRE AND CABLE MANUFACTURERS

Southwire Company

Carrollton, Georgia—TErrace 2-6311

GET INTO ORBIT with...

SHAWMUT'S®

all new
silver plated

ONE-TIME FUSE

THIS
NEW SHAWMUT "FIRST"
IS THE BIGGEST ADVANCE
IN ONE-TIME FUSES SINCE 1900.
WRITE FOR DETAILS TODAY.
O.T.
Les Maintenance says:
SHAWMUT'S® All New One-Time FUSES can't be beat because they...
1. Give predictable performance.
2. Run 38% cooler in switches and enclosures.
3. Give up to 700% more Time Delay.
4. Meet all Federal specs. for One-Time and Time Delay fuses.
5. Exceed all industry standards for One-Times.
6. Are U. L. Approved.
7. Save power through low watt loss.
8. Are the only tested and proven AC-rated One-Times, Shawmut's New One-Times can pay for themselves through power savings alone.
Write for Bulletin O-T 601 today.
THE CHASE-SHAWMUT CO.
374 MERRIMAC ST., NEWBURYPORT, MASS.
SUBSIDIARY OF I-T-E CIRCUIT BREAKER CO.

LOOK FOR **SHAWMUT'S *ALL NEW* ONE-TIME** — The fuse that makes all other One-Times obsolete. Provides *modern* protection for either old or new power circuits. Ask for Bulletin O-T 601.

INFORMATION CENTER

Help yourself to free literature and more details on any products mentioned in this issue.

Instead of writing a dozen different manufacturers for free literature and more information on products, equipment, or services, just insert on the cards below the appropriate key numbers of the items in which you are interested. These cards may be used to get information on products mentioned in the following departments (see Contents Page for page number):

Catalogs and Bulletins
New Utility Equipment
New Electrical Products
Advertisements

Be sure to print or write legibly your name and address—drop it in the nearest mail box and

ES pays the postage!

MARCH, 1961

Send free information on these NEW PRODUCTS and/or services (fill in key numbers):

_____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____ _____

Send this FREE LITERATURE (fill in key numbers):

_____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____ _____

Send free information on these ADVERTISEMENTS:

Company..... Page..... Company..... Page.....
Company..... Page..... Company..... Page.....

My Name ..... **Position** .....
My Company's Name .....
Address (number and street) .....
City ..... **Zone**..... **State**.....

MARCH, 1961

Send free information on these NEW PRODUCTS and/or services (fill in key numbers):

_____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____ _____

Send this FREE LITERATURE (fill in key numbers):

_____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____ _____

Send free information on these ADVERTISEMENTS:

Company..... Page..... Company..... Page.....
Company..... Page..... Company..... Page.....

My Name ..... **Position** .....
My Company's Name .....
Address (number and street) .....
City ..... **Zone**..... **State**.....

These cards can help you get valuable information

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed In the United States

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 582, SEC. 34.9, P. L. & R., ATLANTA, GA.

Electrical South
806 PEACHTREE ST., N. E.
ATLANTA 8, GEORGIA

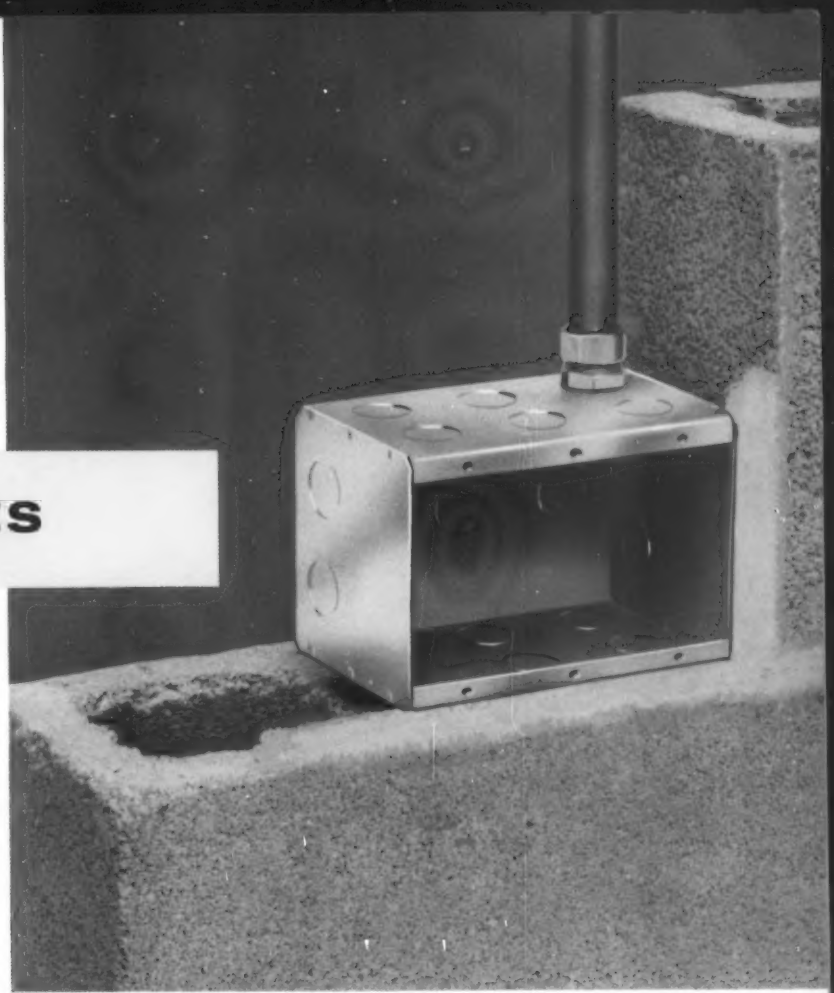
Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed In the United States

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 582, SEC. 34.9, P. L. & R., ATLANTA, GA.

Electrical South
806 PEACHTREE ST., N. E.
ATLANTA 8, GEORGIA

HOW RACO'S MASONRY BOXES AND THRU-THE-WALL BOXES



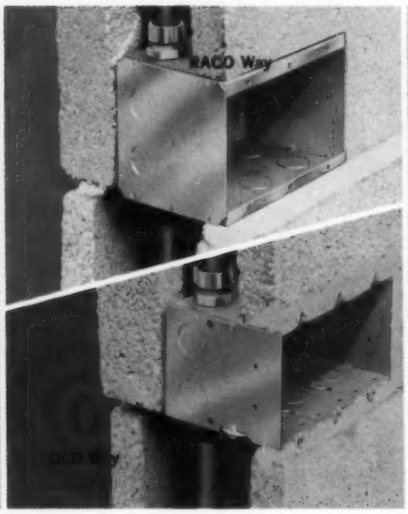
SAVE YOU TIME AND MONEY

HELP YOU DO A BETTER JOB

The only complete line of masonry products.

AIA No. 31-C-71

RACO MASONRY BOXES



The square-cornered "sheer" design of Raco Masonry boxes save installation time. It's easier to cut square rather than "around" rounded corners.

Raco boxes are deep—sized so conduit will position in the voids of the block—yet are flush to the front of the block. Knockouts are located so that you don't have to offset the pipe.

On Raco boxes, the device holes are on the inside of the box. That means a better fit. It also means a neater, speedier job.

RACO THRU-THE-WALL BOXES

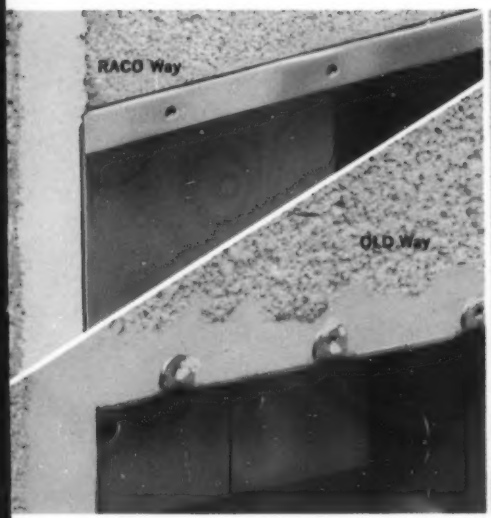
Raco masonry thru-the-wall boxes replace two boxes, one fitting and two plaster covers—eliminate the costly labor of nippling through and installing covers. This adds up to big savings in time.

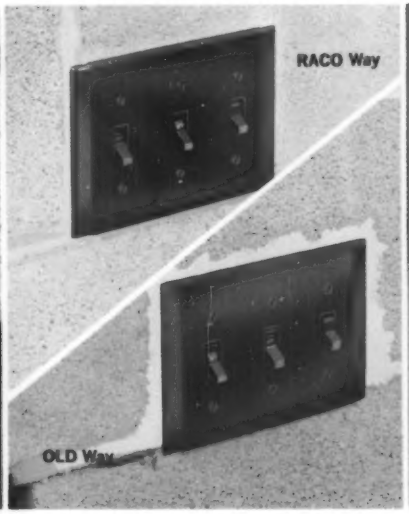
Fitting square cornered Raco boxes requires less effort—less "mudding." There are no covers required. Result: professional job handled with no wasted motion.

Copyright 1961 by ALL-STEEL Equipment Inc.

Fully protected by patents

REAL TIME SAVERS



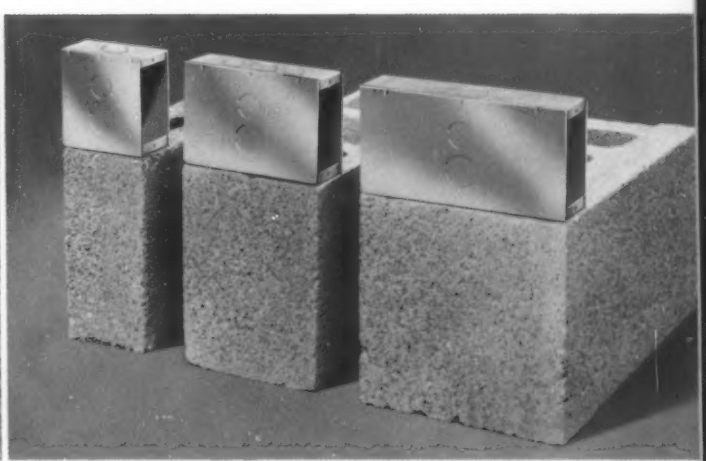


Internal device holes in Raco boxes reduce "mudding around" — also less re-tapping of device holes. Eliminate this time-consuming, irritating job of re-tapping with Raco.

No worry about hiding imperfections behind jumbo device covers when using Raco boxes. They are designed ¼" shorter than other masonry boxes although device holes are standard. Cut costs: use Raco.

Whatever the job, Raco has a time saving masonry box to fit the situation. Available in single, 2, 3, or 4 gang boxes, 2½" or 3½" depths with ½" or ¾" knockouts.

REAL MONEY SAVERS

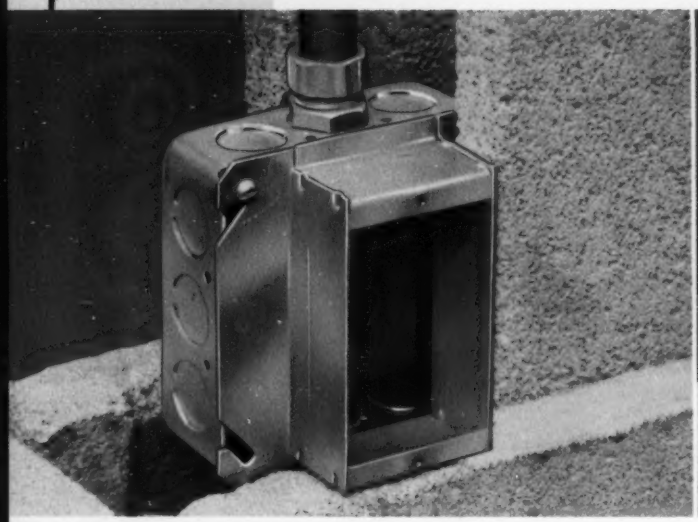


Save money, too. It costs less than half as much (43%) for a Raco masonry thru-the-wall box as for two 4" squares and covers. You save even more when you figure labor costs.

Raco thru-the-wall boxes offer you savings in so many ways. Original cost is lower. Installation time is reduced. Neater looking job. In three sizes—for use with 4", 6" or 8" cement blocks.

RACO

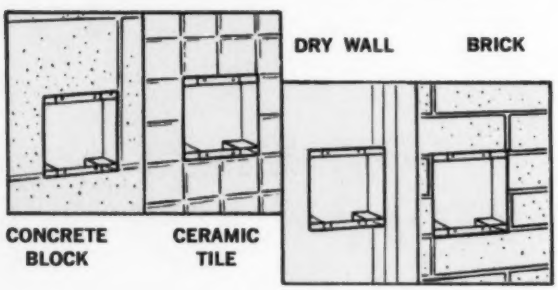
SQUARE-CUT DEVICE COVERS ARE EASIER TO INSTALL



Raco's straight-side design eliminates beveling.

You save time on-the-job in so many ways using Raco 4" square-cut device covers. The straight-side design eliminates beveling—mounting is quick and easy. Available in six cover depths (½" to 2") in single and two device styles. Simplify your job—do it neater and faster with Raco.

Bevel edge plaster rings require much more mudding . . . and result in a rougher finished appearance.



Single Device Square-Cut Device Covers

No. 782	Raised ½"	No. 790	Raised 1¼"
No. 783	Raised ¾"	No. 785	Raised 1½"
No. 784	Raised 1"	No. 786	Raised 2"

Two Device Square-Cut Device Covers

No. 792	½"	No. 797	1¼"
No. 793	¾"	No. 795	1½"
No. 794	1"	No. 796	2"

RACO

BOXES FOR EVERY JOB...FITTINGS FOR EVERY NEED

ALL-STEEL EQUIPMENT INC. AURORA, ILLINOIS

451—3 x 2" Switch box 2¼" deep "Q" Clamp

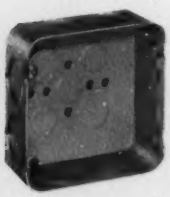
425—3 x 2" Switch box 2" deep Griptite

272—Concrete box 3" deep

1802—No thread rigid connector

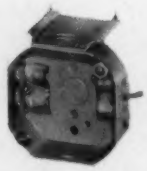
2141—Non metallic cable connector

2622—Pressure cast set screw type coupling



258—4 11/16" Square box 2⅛" deep

190—4" Square box 1½" deep



156—4" Octagon box 1½" deep N Clamps

2204—Angle squeeze connector, 90° two-piece type

2404—Entrance Cap

2602—Pressure cast set screw type connector

Printed in U. S. A.

Andy says:

SAVE NOW... SAVE LATER

With ANDERLITE Fiber Glass Guy Strain Insulators

ANDERLITE Guy Strain Insulators give you big savings now, because the extreme light weight of their aluminum fittings makes them easier to handle; easier to install. Their initial cost is economical, too.

ANDERLITE Guy Strain Insulators give you big savings later, because there's no maintenance. Fiber glass insulating rod is not subject to attacks from insects, birds or animals. Aluminum end fittings are non-corrosive.

Despite their "feather weight" (40% less than other fiber glass insulators having ferrous end fittings, and 85% less than comparable wood insulators), ANDERLITE insulators offer high strength. Ask your nearest representative for complete facts, or write

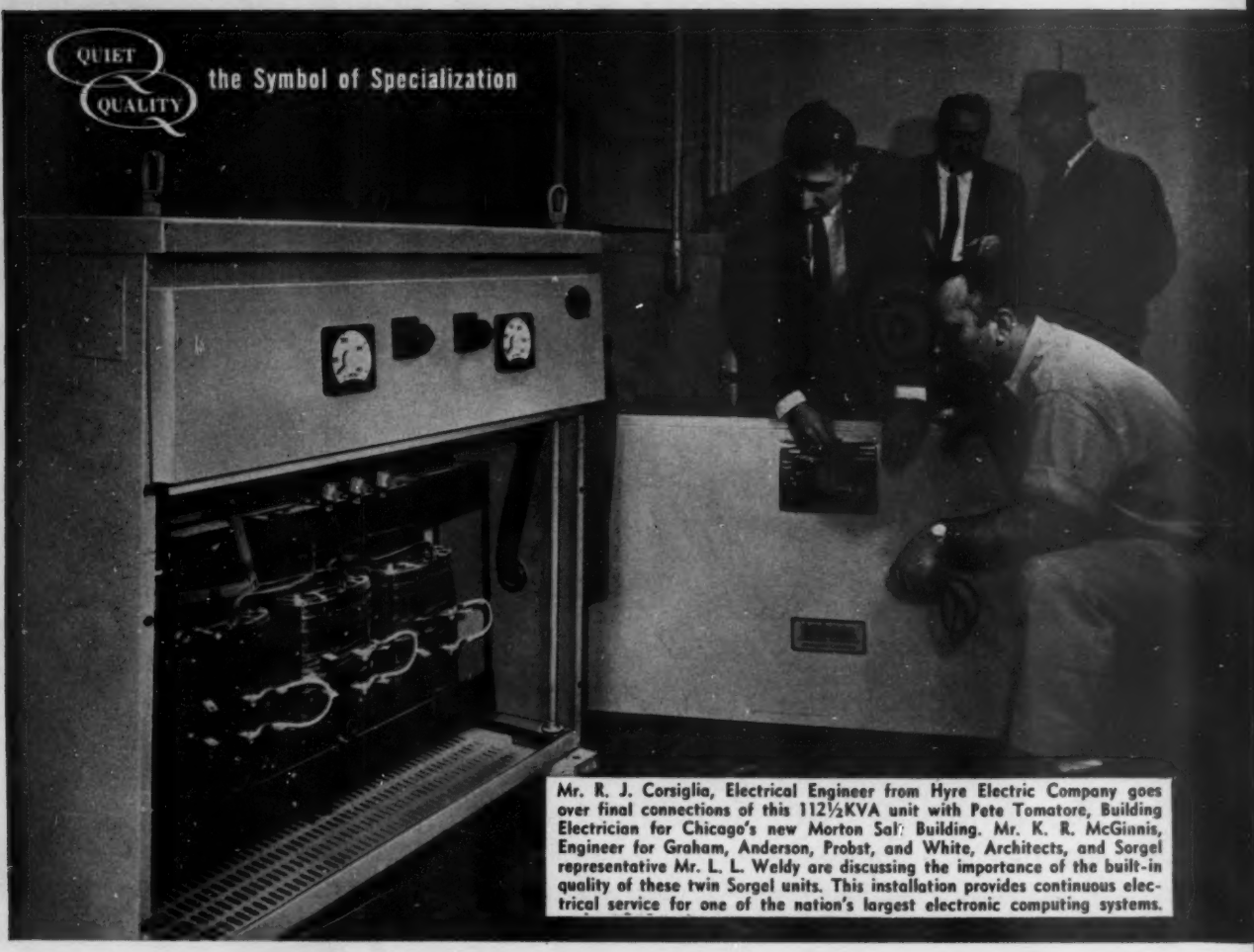
ANDERSON ELECTRIC CORPORATION
P. O. Drawer 2151
BIRMINGHAM 1, ALABAMA

ANDERSON ELECTRIC

Research/ Quality/ Performance/ in Aluminum and Bronze Products

QUIET Q QUALITY

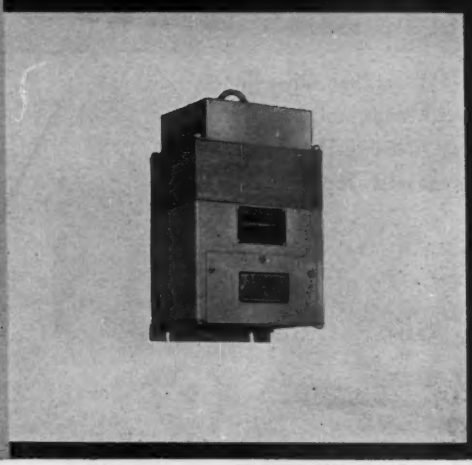
the Symbol of Specialization



Mr. R. J. Corsiglia, Electrical Engineer from Hyre Electric Company goes over final connections of this 112½KVA unit with Pete Tomatore, Building Electrician for Chicago's new Morton Salt Building. Mr. K. R. McGinnis, Engineer for Graham, Anderson, Probst, and White, Architects, and Sorgel representative Mr. L. L. Weldy are discussing the importance of the built-in quality of these twin Sorgel units. This installation provides continuous electrical service for one of the nation's largest electronic computing systems.

SORGEL HAS A DRY-TYPE

1/4 KVA TO 10,000 KVA, ALL STANDARD AND INTERMEDIATE VOLTAGES UP TO 15,000 VOLTS



Unit above is typical of construction for ¼ KVA up to 7½ KVA sizes. Popular sizes up to 75 KVA both single and 3-phase transformers are normally in factory stock.

Stock units, such as 75 KVA shown here, are shipped on day order is received. All sizes up to 75 KVA are constructed to be interchangeable for floor or wall mounting.

HERE'S WHY SORGEL TRANSFORMERS MEAN DOLLARS AND SENSE TO YOU

Sorgel equipment installs easier, provides unusual reliability, and operates economically at high efficiency

More and more Sorgel dry-type transformers are being installed daily in new or modernization construction for schools, shopping centers, hospitals, industrial plants and office buildings of all sizes. Here's why: Contractors prefer Sorgel primarily because of their easy installation and reputation for quality. Enclosures are self-supporting. Entrance can be made on sides, top, bottom or back. Solderless connectors speed up terminal wiring, as does roomy compartment.

Consulting and plant engineers insist on Sorgel quality because of high efficiency, and a fully rated load operating continuously at a safe temperature.

Direct advantages of Sorgel equipment to all buyers include lower copper loss, lower core loss and the lowest sound levels available. Sorgel continuously provides the most liberal designs and a coordinated system of either Class B, F, or H insulation with effective use of quality materials throughout each transformer produced. Take advantage of this unique combination of experience and engineering skills by insisting on Sorgel quiet quality transformers.

SORGEL
SOUND-RATED DRY-TYPE
TRANSFORMERS

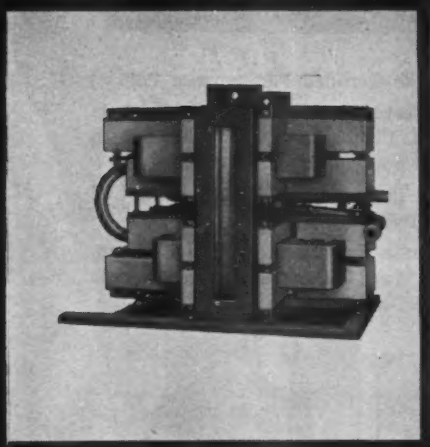
SORGEL ELECTRIC COMPANY

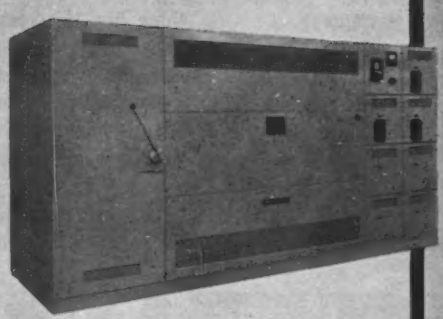
Since 1916 the pioneer in the development, manufacturing and application of sound-rated dry-type transformers

835 WEST NATIONAL AVENUE • MILWAUKEE 4, WISCONSIN

Experienced sales engineers in principal cities

TRANSFORMER FOR YOUR EVERY NEED





CLIP AND MAIL FOR TECHNICAL BULLETIN$.

- ☐ 611—Transformer Line
- ☐ 960—Sub-stations
- ☐ 658—DC Saturable Reactors

Name_____

Title_____

Address_____

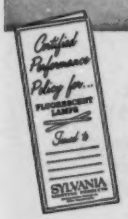
City_____

State_____

This electrical magnetic pump transformer, used with fluid lithium, is an example of Sorgel's engineering abilities to handle tough customer designs.

This 2,000 KVA, 3 phase, 13,200 volt, unit is typical of Sorgel load centers. These units are procurable with any type or make of switch gear.

to give you your money back



Have *you* read the Sylvania guarantee?

"If at any time a Sylvania Fluorescent Lamp fails in your opinion to provide better performance than any other brand fluorescent lamps, on the basis of uniformity of performance, uniformity of appearance, maintained brightness and life, it may be returned to the supplier for *full refund of purchase price.*"

(Only Sylvania dares to back its fluorescent lamps with anything like this remarkable Certified Performance Policy.)

This guarantee of quality is your assurance, too, that Sylvania actually lowers your TCL (Total Cost of Lighting), which means cost of lamps *plus* power *plus* maintenance.

Want better light? Want to be *sure* you're buying it? Call your Sylvania representative. Or write us:

Lighting Division, Sylvania Electric Products Inc., Dept. 73, 60 Boston St., Salem, Mass. In Canada: Sylvania Electric (Canada) Ltd., Montreal.

SYLVANIA

Subsidiary of GENERAL TELEPHONE & ELECTRONICS

on

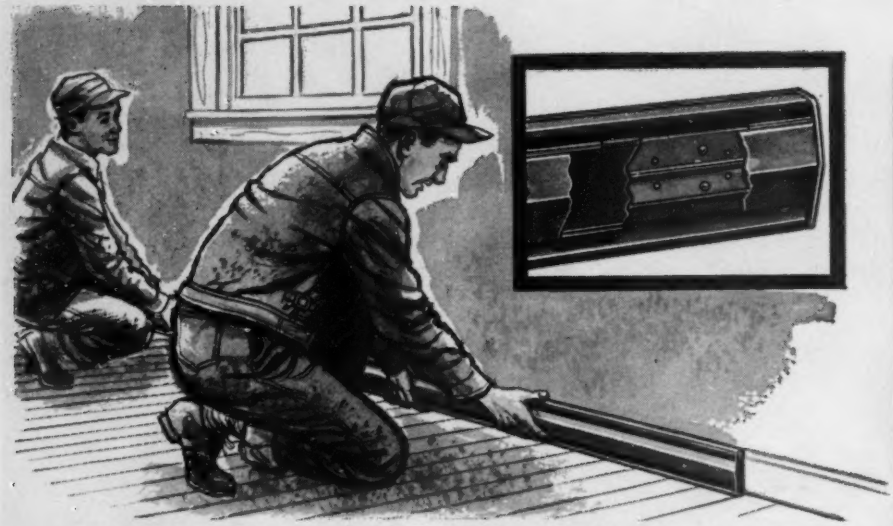
LACLEDE *HOT DIPPED GALVANIZED* RIGID CONDUIT

Laclede Rigid Conduit is made from open-hearth steel produced in Laclede's own mill. Throughout manufacture, metallurgy is closely controlled to achieve the ductility and uniformity of grain structure that permits smooth, easy bending. And even in sharp bends, the protective zinc coating on Laclede Rigid Conduit will not crack or fracture. This quality conduit offers many outstanding benefits:

- Hot dipped galvanized inside and out
- Smooth inner raceways for easy wire pulling
- Precision cut, zinc coated threads, protected during shipment and storage with tough plastic caps
- Meets Underwriters, A.S.A., State and Federal specifications
- Available from stock for quick delivery

LACLEDE STEEL COMPANY

6062 SAINT LOUIS, MISSOURI ◆ Producers of Steel for Industry and Construction



When Cleaner, Quieter, More Efficient Martin "Twin-Fin" Electric Baseboard Goes In... Permanent Customer Satisfaction Goes In, Too!

When you use Martin "Twin-Fin" electric baseboard you automatically include the major features which customers want in perimeter heat. Here's why:

- **Martin "Twin-Fin" is engineered for unrestricted air flow to reduce dust and lint collection. This assures cleaner walls and more efficient heat distribution.**
- **The process which coats Martin "Twin-Fin" with Lifetime Porcelain not only assures permanent protection against rust and corrosion, it prestresses the metal reducing expansion and contraction. This insures quiet trouble free operation.**

These are advantages the customer can understand, advantages that help you sell. But they are only a small part of the Martin "Twin-Fin" parade of features that mean more sales for you, features like these:

- **Six feet and three feet lengths for easier layout.**
- **Choice of built-in and wall thermostats.**
- **Choice of low or high wattage per lineal foot.**
- **Pre-wired raceways for faster installation.**
- **Roller bracket element mounting.**
- **Heating element sealed for quiet and safety.**

All Martin Electric Heat products, like these "Twin-Fin" baseboards, are backed by 56 years of heating experience. When you choose Martin, you choose the leadership line. The line designed to put you out in front in the swing to electric heat. Catalogue and complete details on request.

"TWIN-FIN" ELECTRIC BASEBOARDS

ELECTRIC WALL HEATERS

ELECTRIC PORTABLE HEATERS

ELECTRIC BATH HEATERS

ELECTRIC CEILING CABLE

ELECTRIC FLOOR FURNACES

MARTIN

STAMPING & STOVE COMPANY

HUNTSVILLE, ALABAMA

AMERICA'S MOST COMPLETE HEATING LINE

FROM EVERY ANGLE

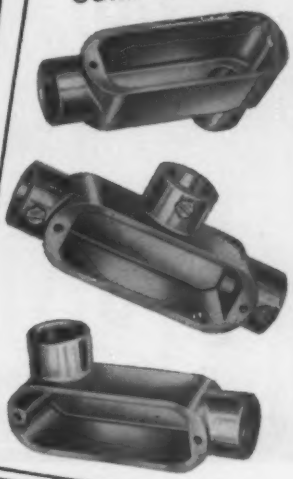
RED ● DOT FITTINGS offer

VALUE
QUALITY
PROFIT

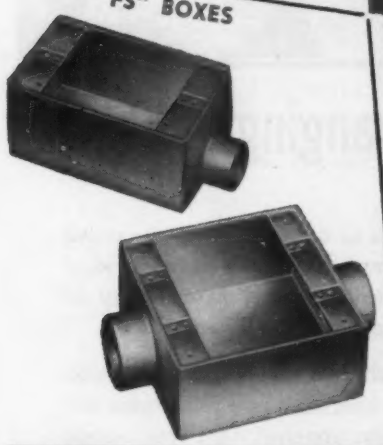
ENTRANCE ELLS

"ELECTRO - SERTS"

CONDUIT BODIES



"FS" BOXES



WITH
EVERY WANTED FEATURE!

- Ultra-Hi Pressure Cast
- Aluminum, Copper Free Alloy
- Roomy, Unobstructed Interiors
- Flat Backed for Snug Fit
- Outstanding Design
- Satin Smooth, Inside & Out
- Adaptable for Every Use

COVERS & CORNER ELLS

WAREHOUSE INVENTORIES CARRIED IN:

ATLANTA
BALTIMORE
BOSTON
CHICAGO
CLEVELAND
DALLAS
DENVER
DETROIT
GREENSBORO, N. C.
INDIANAPOLIS
KANSAS CITY
LOS ANGELES
MIAMI
MINNEAPOLIS
NEW YORK
PHILADELPHIA
PITTSBURGH
PORTLAND, ORE.
ROCHESTER
SAN FRANCISCO

Write today for new illustrated catalog of the Complete RED ● DOT Line.

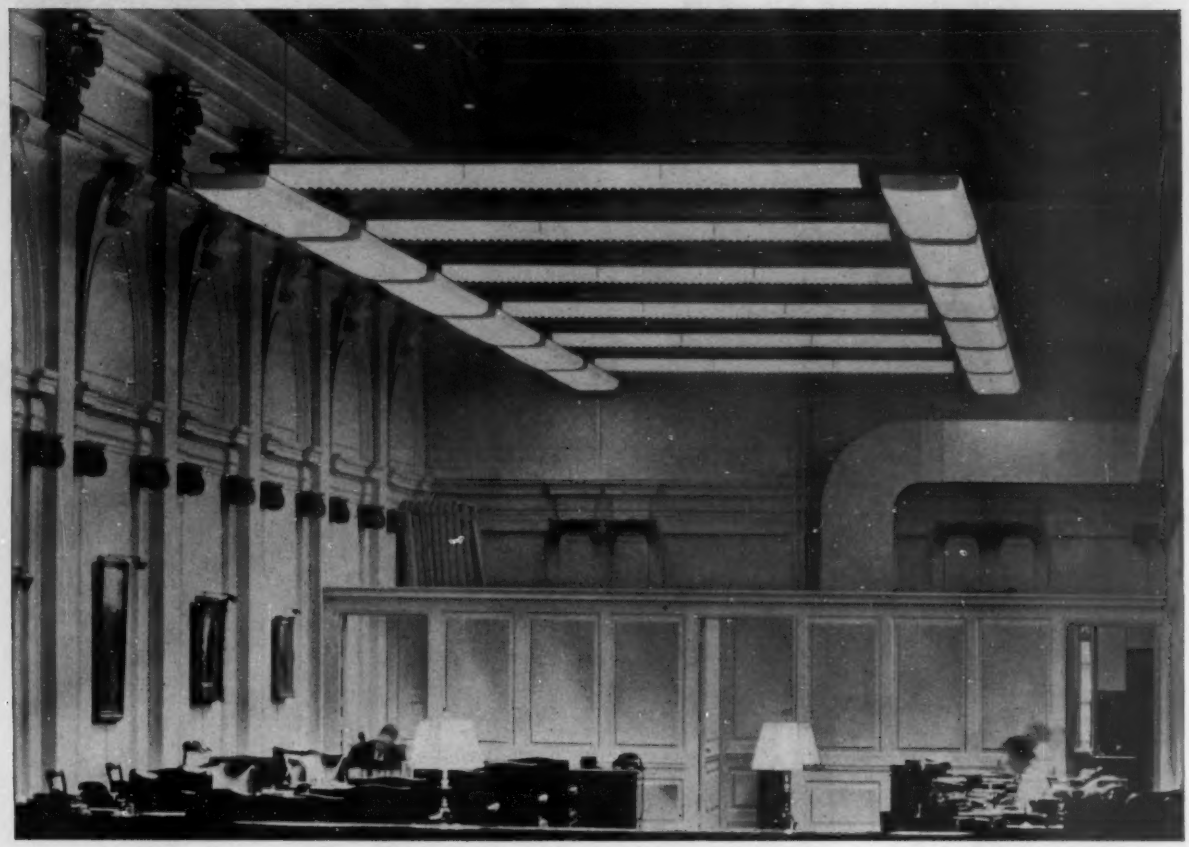
RED ● DOT EXCELS

Sold only through authorized Electrical Wholesalers

SERVING INDUSTRY Mason FOR 30 YEARS

L. E. Mason Co. BOSTON 36, MASSACHUSETTS

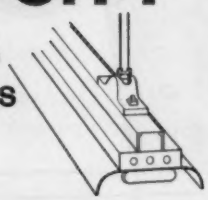
Look OVER the bright lights—



where NOLAND solves your fixture hanging problems

STEEL CITY CHANNEL

Mounts, Hangs and Feeds the Fixtures



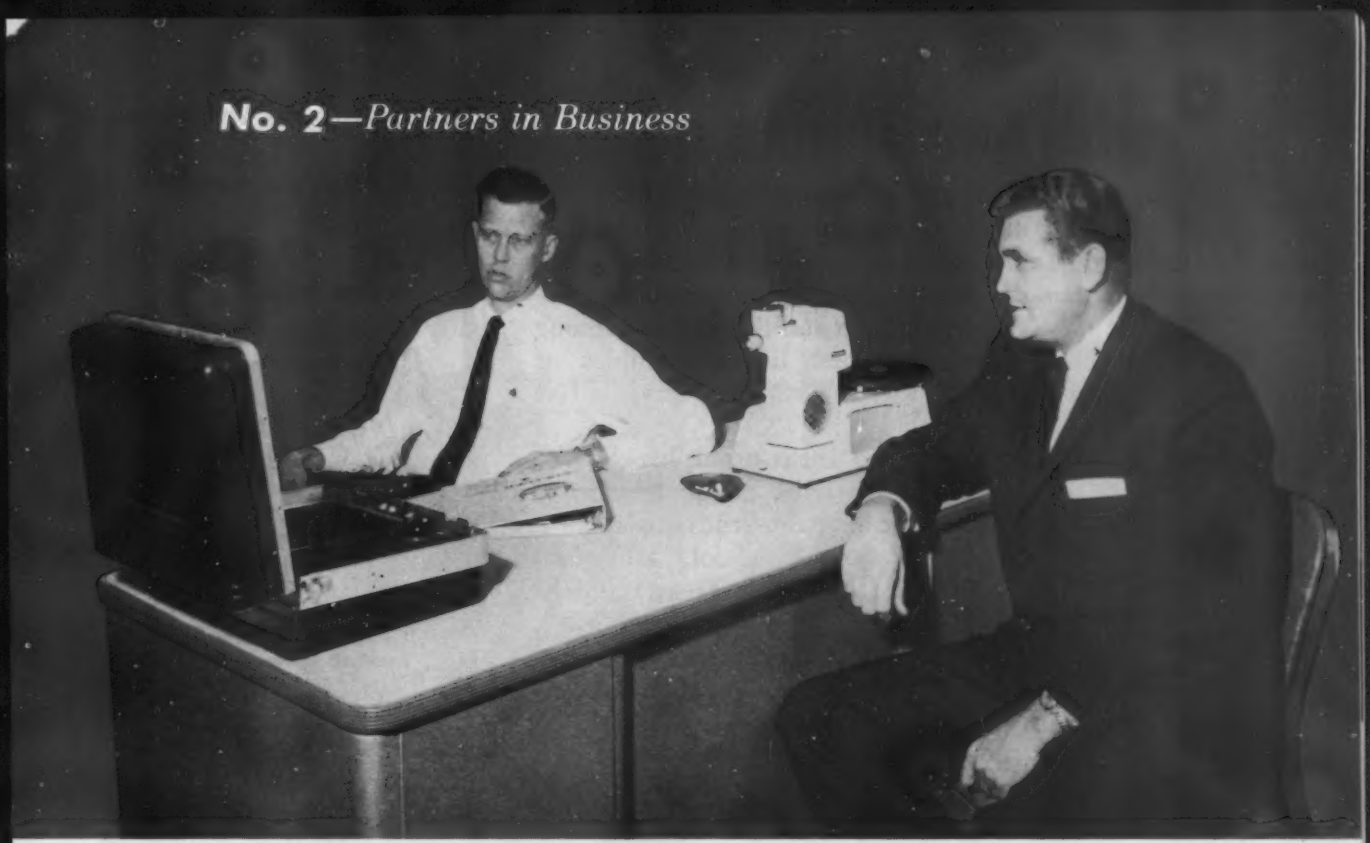
Here's a channel that adapts to any interval of structural support—may be dropped to any level where it becomes a rigid platform for fixture attachment. Lighting fixtures may be spaced and fastened anywhere along the channel system.

Branch lighting circuit conductors are completely enclosed in channel from panel to fixture. This raceway carries full Underwriters' Laboratories, Inc. approval. Call your nearest NOLAND branch for illustrated booklet G-2.

37 BRANCHES SERVING THE SOUTH

NOLAND

NOLAND COMPANY INC WHOLESALE DISTRIBUTORS: PLUMBING HEATING
INDUSTRIAL ELECTRICAL REFRIGERATION AIR CONDITIONING MACHINE TOOLS



L & P Agents Serve Their Distributors

L & P agents carry partnership in business on to their distributors. In the truest sense of the word, they represent their manufacturer, carrying out the L & P policy of service not merely before the sale, but after the sale as well.

Whatever L & P agents can do to help their distributors, they do cheerfully and well. Catalogs, price sheets, specifications, installation data—all these are available to you through your nearest L & P agent, plus personal, interested help in solving any specific lighting problem you have. L & P agents can offer this kind of service, because they know the L & P plant and staff are solidly behind them.

LIGHT & POWER UTILITIES CORP. L&P

L & P LIGHTING

OLIVE BRANCH, MISS.

1035 FIRESTONE BLVD. • MEMPHIS, TENN.

Partners in Business

Long time "partners in business" are Thomas B. Owen and William T. Craig, who as Craig-Owen Co., Chattanooga, Tenn. have been serving the industry for 11 years. Among L & P Lighting's top manufacturers' agents, Tom and Bill are also among the very best living examples of what L & P means by "service after the sale."

WILLIAM T. CRAIG

Taking them up alphabetically, Bill Craig learned the technical side of his business by studying at VPI, Bliss Electrical School, MIT and Syracuse University. There followed a number of positions "in the field", electrical and engineering assignments that added the sound, practical side. Thus, when Bill talks L & P fixtures, he is thoroughly grounded in all the necessary details.

THOMAS B. OWEN

Tom Owen is a graduate of the University of Notre Dame, and had solid experience in advertising and sales managing before becoming an agent in 1949. He's a fellow who knows his product thoroughly, and feels that the key to building a successful business like Craig-Owen is to get good distributors, and then serve them so well they wouldn't think of turning to anyone else.

Together, Tom and Bill make a conscientious, hard-working, experienced team. They list among their assets "good products — L & P fixtures are excellent — plus solid backing from the factory, skilled assistance from L & P's engineering staff, and above all, a real interest in our distributors and their problems."

In the final analysis, however, it is Tom Owen and Bill Craig, themselves, that have kept their L & P customers satisfied and lasting customers. If YOU are in their territory, and need lighting fixtures, give them a call. They'll be delighted to serve you.

LIGHT & POWER UTILITIES CORP. L&P

L & P LIGHTING

Olive Branch, Miss.

1035 Firestone Blvd. Memphis, Tenn.

Distributed by Wholesale Dealers Only

There's an

L&P

Representative Near YOU!

For further information and prices on L & P fluorescent fixtures—standard or "custom-made"—check the following list, and phone or write the L & P representative nearest you:

(F—Fluorescent)
(I—Incandescent)

Associated Manufacturers Agents (F)
900 Carondelet St.
New Orleans, Louisiana

W. K. Carney Co.
P. O. Box 3145
Bellaire, Texas

James E. Clary (F - I)
62 Flicker
Memphis, Tennessee

Craig-Owen (F - I)
306 E. 11th St.
Chattanooga, Tennessee

C. V. Hammon (F - I)
845 S. W. 52nd St.
Oklahoma City, Oklahoma

J. F. Hisserich (F - I)
2001 Big Bend Ave.
St. Louis, Missouri

Howard E. Johnson (F - I)
2976 Randy Lane
Dallas, Texas

Allan M. Kahoe (I)
8849 25th St.
Metairie, Louisiana

Richard B. Murdoch (F - I)
7300 Bailor Ave.
College Park, Maryland

William B. Murray (F - I)
531 Western Ave., N.W.
Atlanta 14, Georgia

N. B. Nichols (F - I)
2509 Bishop
Little Rock, Arkansas

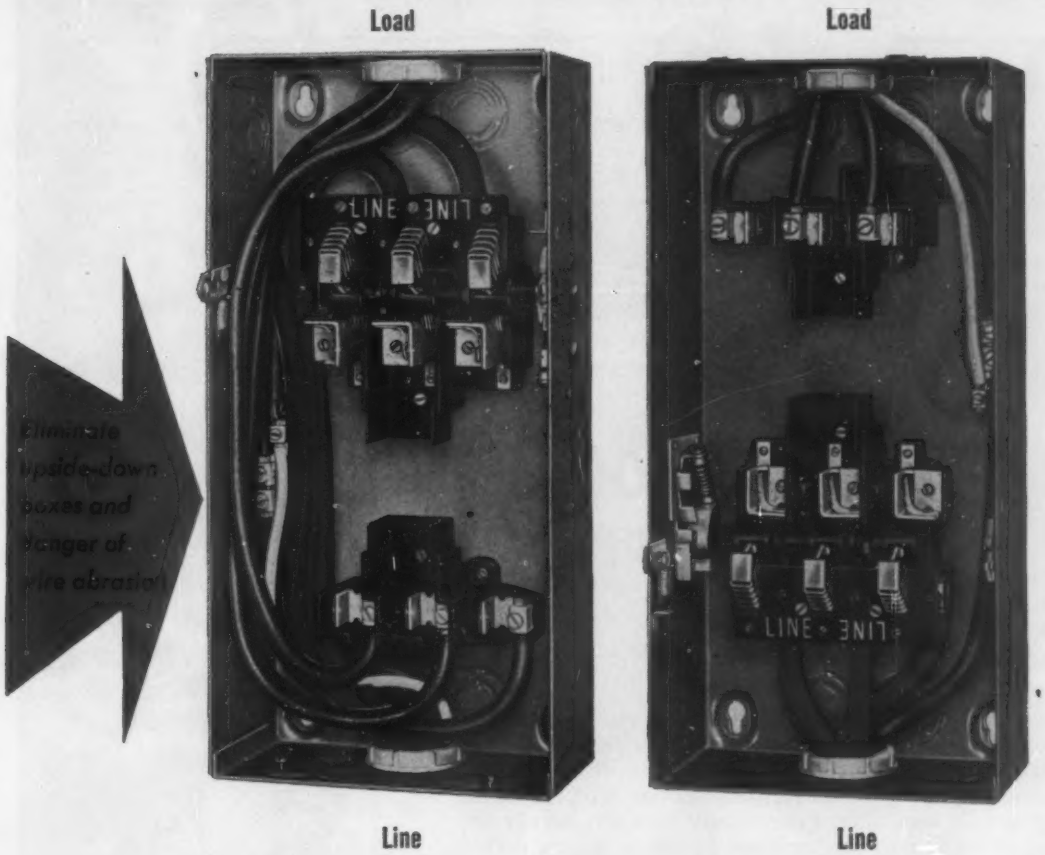
Joe E. Pearce & Associates (F - I)
50 N. Kenmore
Indianapolis, Indiana

Gerald Preacher (F - I)
116 N. Church St.
Lexington, South Carolina

Arthur H. Swartz (F - I)
2120 Polk Ave.
Houston, Texas

Light & Power Utilities Corp. (F-I)
P. O. Box 157
Olive Branch, Mississippi

Save up to $30 on cable cost with new G-E reversible-wiring safety switches



Old way wastes wire, work and money. Looped cable inside box presents danger of wire abrasion. None of this is necessary when you use new General Electric reversible-wiring safety switches, 100-amp and above.

New G-E way eliminates danger of wire abrasion, inconvenience of upside-down boxes. ON-OFF indication remains unchanged. Available with line lugs factory-installed at bottom, or for field installation.

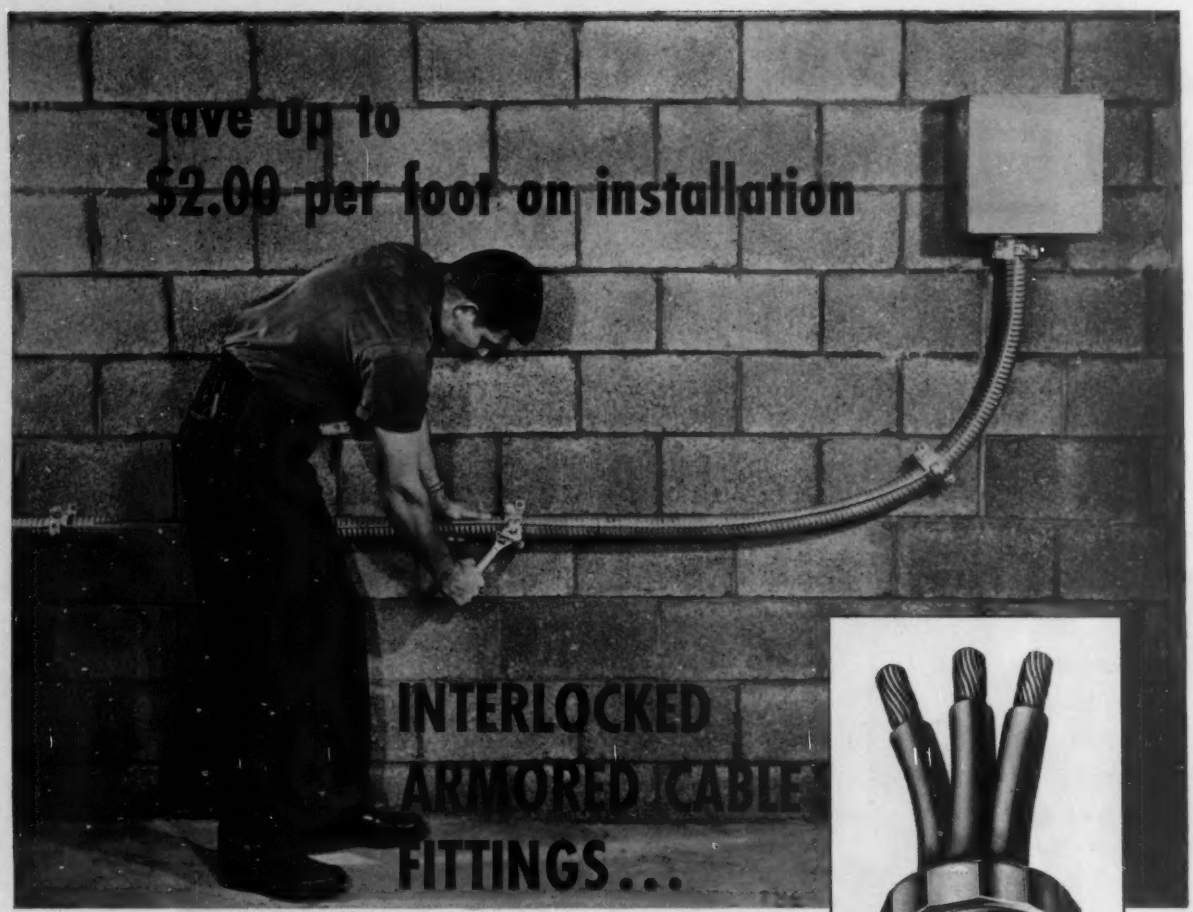
SCHEDULE OF SAVINGS ON CONDUCTOR COSTS

Switch Rating	Conductor Size	Amount Saved Per Switch Installed*		Length of Wire Saved (In Feet)	
		2-Pole	3-Pole	2-Pole	3-Pole
100 AMP	2	$ .91	$ 1.36	5	8
200 AMP	3/0	3.73	5.60	9	14
400 AMP/240 VOLT	500 MCM	12.56	18.90	11	16
400 AMP/600 VOLT	500 MCM	13.74	20.60	12	17½
600 AMP/240 VOLT	(2) 350 MCM	18.70	28.10	22	33½
600 AMP/600 VOLT	(2) 350 MCM	20.40	30.60	24	36½

*Based on approximate contractor prices for Type RHW copper building wire.

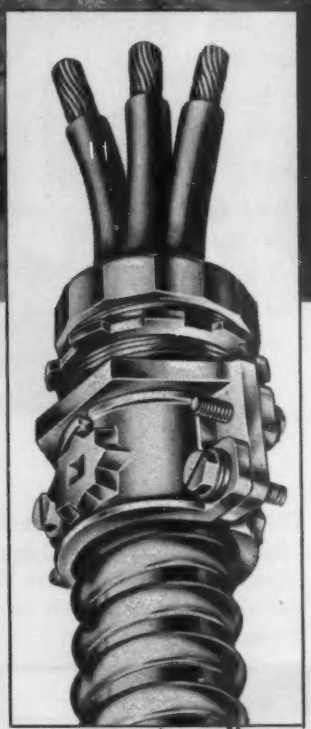
GENERAL ELECTRIC

Circuit Protective Devices Dept., Plainville, Conn.



T&B's modular fitting system provides an economical solution to practically *every* interlocked armored cable installation problem. You can save the cost of installing baskets, ladders, troughs and trays — and still run Interlocked Armored Cable everywhere . . . vertically, horizontally, straight or curved. You support cable on walls, ceilings, pillars or beams with a mounting bracket no wider than a fitting . . . suspend it from messenger wire over long spans. You can make 27 *different* kinds of terminations — in dry, damp or wet locations — with or without separate ground. All parts have standard threads and are interchangeable. You can accommodate every armor diameter that falls within each knockout size in a continuous, overlapping range from ¾″ to 4″.

Contact your local T&B Distributor or write for Bulletin F5-47 to: The Thomas & Betts Co., Incorporated, Elizabeth 1, New Jersey. In Canada: Thomas & Betts Ltd., Montreal.



pat. pending

All Products Sold Only Through Authorized T&B Distributors

T&B ENGINEERED

THOMAS & BETTS

KNOW YOUR SYMBOLS

This symbol stands for fusible switch

This symbol stands for QUALITY

THE SAFETY SWITCH THAT CHALLENGES COMPARISON . . .

BullDog's general-duty safety switch!

- Minimum arcing—double break switching
- Arc control—Vacu-Break® principle
- Pressure contacts—Clampmatic® spring action
- Positive switching—direct handle operation
- Front operation—permits ganging

. . . plus, all current-carrying parts are silvered. Available in NEMA 1 and NEMA 3R enclosures . . . competitively priced. Challenge our distributors to prove these switches are the finest. Write for details!

BullDog Electric Products Division, I-T-E Circuit Breaker Company, Box 177, Detroit 32, Michigan. In Canada: 80 Clayson Rd., Toronto, Ont. Export Division: 13 East 40th St., New York 16, N. Y.

Consult the following Southern representatives:

Wilson Electrical Equipment Co.
3210 Garrow St., P.O. Box 1725
Houston, Texas

Wilson Electrical Equipment Co.
101 E. Maple Street
San Antonio, Texas

Standard Electric Mfg. Company
2401 Federal St., P.O. Box 1138
Dallas 1, Texas

Walker Electrical Co., Inc.
125 Bennett St., N.W., P.O. Box 2308, Station D
Atlanta, Georgia

I-T-E

I-T-E CIRCUIT BREAKER COMPANY
BULLDOG ELECTRIC PRODUCTS DIVISION

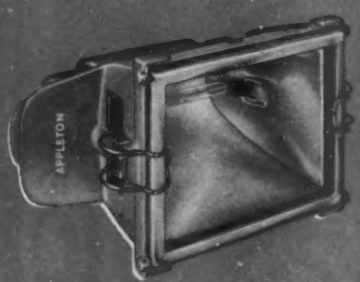
all new...from

The greatest line of lighting ever offered the industry

Each floodlight engineered for maximum lumen output ...Appleton Laboratory Engineered

Highest quality standards of construction throughout...yet competitively priced

First!—the APPLETON Intensa "Quartzlite 1500"
Big brother to the fabulous "Quartzlite 500," this super floodlight is the answer to maximum lumen output at economical cost. Every convenience built in . . . Appleton laboratory engineered throughout. Available in narrow, medium and wide beam spread. Pole top or crossarm mounting. Exclusive swing-over feature for relamping from rear. **Write for Bulletin QL 15-161.**



First!—the APPLETON Intensa "Quartzlite 500"
The sensation of 1960! A beautiful, economical, high lumen output floodlight in a small package. The first of its kind to dissipate heat for proper operation of the iodine cycle lamp. Acclaimed and used, everywhere. **Write for Bulletin QL 500.**

Never before in lighting history has there been such an offering as the new line of APPLETON floodlights. Each individual unit represents the latest in engineering . . . performance-proved in APPLETON's own laboratories. Not just one model, but *every* model incorporates the finest in design, the finest in construction, the greatest number of built in features and the greatest possible lighting efficiency. Before specifying floodlights for your next installation, check APPLETON.

APPLETON® *electric company*

1701 Wellington Avenue, Chicago 13, Ill.

APPLETON®

Introduced for the first time at the 3rd NATIONAL LIGHTING EXPOSITION

Most Economical!—APPLETON "Econoflood"
Appleton's new, competitively priced aluminum floodlight. May be relamped from front or (by exclusive new swing-over relamping design) from rear. A quality floodlight in every detail. Available in all 5 IES-NEMA beam spreads. **Write for Bulletin EF 700.**

Rugged! Dependable!—APPLETON "Generalflood"
A superior line of special duty aluminum floodlights with a host of convenience features. 14" floodlights for 300-500 watt lamps. 16" floodlights for 750-1000 watt lamps. Available in narrow, medium, wide beam spreads. **Write for Bulletin GF 650.**

Ask about the exclusive Appleton trunion feature with permanently locked in aiming device.

King of the Floodlights!—APPLETON "Sportsflood"
A brilliantly designed, back-relamping aluminum floodlight with many exclusive Appleton-designed features. A major sports floodlight. Available in all 5 IES-NEMA beam spreads. **Write for Bulletin SF 900.**

High Lumen Output!—APPLETON "Mercuflood"
One of the newly-designed Appleton floodlights engineered expressly for uses with 1000 watt mercury vapor lamps. Highest lumen output per watt. **Write for Bulletin MF 251.**

The APPLETON *Intenso** Series

***The premium quality lighting line of the industry!**

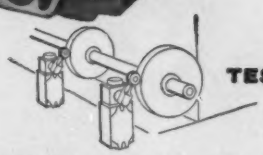
Only ALLEN-BRADLEY LIMIT SWITCHES FINISHED TEST with *NO FAILURES!*

...and remained good for many more millions of trouble free operations

Recently, a large user of limit switches selected two identical units from each of five leading manufacturers and subjected them to the same accelerated life test. When the test was stopped after many, many millions of operations, only Allen-Bradley Bulletin 802T oiltight limit switches were left *with no failures!* Also, a careful inspection of these two Bulletin 802T limit switches suggested that they were still good for *many more millions* of operations.

The Allen-Bradley "built-in" quality is the reason for such unmatched performance. With switch bodies and operating heads positively sealed against oil and dirt, A-B Bulletin 802T limit switches are free from contact fouling and sluggish operation. The precision switch mechanism has a positive snap action—it is impossible for vibration to cause contact chatter. The double break, silver contacts never need servicing.

Insist on Bulletin 802T oiltight limit switches. Send for details on the complete A-B limit switch line.



TEST SETUP

Purchased through regular supply channels . . .

and tested under identical conditions, insuring an impartial evaluation of performance. Of the ten limit switches tested (two each of five different makes), only three were operating when the test was stopped. Two were A-B Bulletin 802T switches and one of another make, of which the second unit had failed early in the test. On this accelerated life test, one unit switched 1.0 ma at 115 v dc while the other unit switched 10 ma at 115 v dc.

ALLEN-BRADLEY Quality Motor Control

Member of NEMA

Allen-Bradley Co., 1305 S. First St., Milwaukee 4, Wis. • In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

CONSULT YOUR LOCAL ALLEN-BRADLEY REPRESENTATIVE

ATLANTA—Roy E. Wilson Co., 1062 Northside Drive, N. W., Tel: TRinity 6-8833
BALTIMORE—H. M. Wood & Co., Inc., 124 Light St., Tel: MUlberry 5-4643
BIRMINGHAM—J. L. Howarth Co., Inc., 825 S. 22nd St., Tel: FAirfax 3-1171
CHARLESTON—Henry E. Payne, 918 Kanawha Blvd., E., Tel: Dickens 3-1393
CHARLOTTE—LeRoy P. Spoon, 307 Lincoln St., Tel: EDison 4-6334
DALLAS—Allen-Bradley Co., 2810 McKinney Ave., Tel: TAylor 3-6179
HOUSTON—Allen-Bradley Co., 2105 McKinney Ave., Tel: CApitol 5-0747
JACKSONVILLE—Van & Smith Co., Inc., 1446 June St., Tel: EXbrook 8-0531
KANSAS CITY—B. L. McCreary & Son, 1819 Central St., Tel: HArrison 1-1668
KNOXVILLE—Bowditch & Co., 1311-C N. Broadway, P. O. Box 3145, Tel: 4-2513
LITTLE ROCK—Curtis H. Stout, Inc., 400 Shall St., P. O. Box 107, Tel: FRanklin 4-8201
LOUISVILLE—The Rietze Company, 2209 S. Floyd St., Tel: MElrose 7-3603
MEMPHIS—Curtis H. Stout of Tennessee, Inc., 718 M & M Bldg., Tel: JAckson 6-7601
MIAMI—Charles R. Lee & Assoc., Inc., 3796 W. Flagler St., Tel: Highland 4-7414
NEW ORLEANS—Robbins & Robbins, 1037 Magazine St., Tel: JAckson 2-5805
ST. LOUIS—Allen-Bradley Co., 904 N. Grand Blvd., Tel: JEfferson 5-1901
TAMPA—Van & Smith Co., Inc., 4025 Henderson Blvd., Tel: 8-3632
TULSA—John W. Elder Co., 1526 East Fourth St., Tel: Diamond 3-9149

No. 8600
Series Fluoresign

No. 3151-A Floodlight

Widest line of fixtures lets you achieve decorative lighting effects the one best way for each job

When you plan an outdoor application for dramatic architectural lighting, plan it the way you know is best for the job, then see your Revere wholesaler for the lighting equipment required. From Revere's complete line, you can select exactly the right fixtures to give the decorative lighting effect you want.

Revere offers the industry's widest line of matched outdoor lighting equipment. For decorative lighting, or parking lots, or sports areas, or airports—or for virtually any outdoor application — Revere equipment lets you solve the problem the one *best* way. Whatever you need — hinged or rigid poles . . . mercury, incandescent or fluorescent luminaires . . . floodlights, fixtures, fittings — can be supplied by Revere in the size and types specified in your plans.

Ask your wholesaler about Revere outdoor lighting equipment for your next job. For a copy of Revere's catalog, write to us.

Revere
ELECTRIC MFG. CO.

OUTDOOR LIGHTING

Revere Electric Mfg. Co. • 7420 Lehigh Avenue • Chicago 48, Illinois (In suburban Niles)
Long Distance Phone: NIles 7-6060 • Chicago Phone: SPring 4-1200 • Telegrams: WUX Niles
In Canada: Curtis Lighting, Ltd., Leaside, Toronto, Ontario

Two-light brackets are located between entrances of individual units at the new Suntide Inn Motel.

Well planned lighting makes the office an ideal place to greet guests.

Imaginative

Entire layout

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electrical Utilities ✔
- Electrical Wholesalers ✔
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers ✔

By W. U. McCoy, Electrical South Field Editor, Oklahoma City, Okla.

◆ It may be commonplace among motel owners to say that lighting draws business, but Oklahoma City's new Suntide Inn motel is drawing heavy, steady business on motel-dotted Route 66.

And the distinctive difference between Suntide and the many other good motels on this route through the city is the lighting.

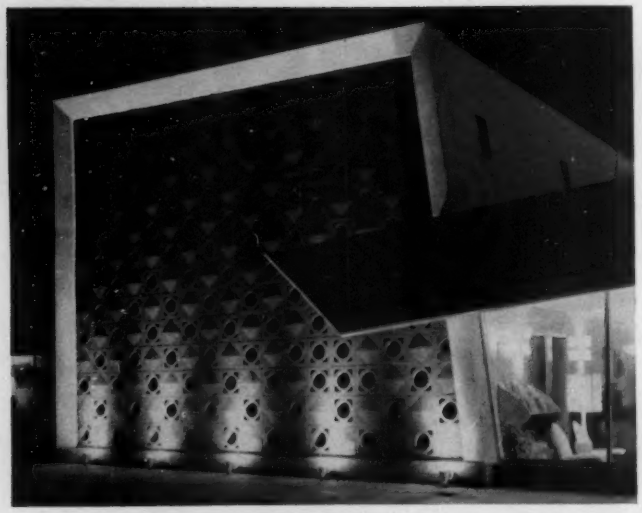
Some motels plunge heavily on a big identifying sign, then fail to

Motorists can easily see the motel, with 1,200 flashing colored bulbs orbiting around the sign.

lighting amplifies appeal of motel

gets functional illumination as a result of careful planning

The restaurant interior lighting features lantern type fixtures, and recessed, dropped dome, and bracket lights.



Five floods dramatize the exterior wall of the motel office.

A switch near the door controls the cluster of lights.

A single pendant fixture provides ample light for bed reading.

take advantage of the many other sales talks lighting can give. Suntide, too, believes in the big sign. In this case, 1,200 flashing colored bulbs, "orbiting" around a big circle, carry the Suntide Inn signature in massive letters against a background of colored stars. The sign gets attention from a distance down heavily traveled 66.

But once this attention has been obtained, other imaginative lighting tells the traveler this is a place he would enjoy. And it tells it in many visible ways.

Suntide grew from some patient planning and research into one of the best motels available for study.

Owner Lyle Overman had been collecting good motel design ideas for some years. Then he and Suntide's designer, O. William Chandler, took an extended tour to see a large number of the best motels throughout the country. Then the consulting engineering firm of Soter and Sprehe was called in to join planning on the electrical job.

The electrical contract was awarded to the Otto R. Krueger Electric Co., 2410 N. Robinson, one of the city's oldest construction firms.

Jim Krueger, president, said, "Work on this one was a real pleasure. The owner was out to get the best job possible, and he was ready at all times to approve the methods and materials which would achieve that job."

In discussing desirable lighting features, Mr. Krueger first pointed to the restaurant, located across the wide driveway, swimming pool, and sign area from the office. Except for slender circular columns of roman brick, glass is used on three sides, and 32 lights are used on the outside front alone.

This includes ten small ground floods at the base of the masonry, and 22 lights in the overhang. The gaily lighted interior features Japanese lantern type hanging fixtures, recessed fixtures, dropped dome, and bracket lights.

Most of the restaurant lighting is on dimmer switch, with the more secluded dining area always on dimmer unless more light is needed by large groups, banquets, etc. The dimmer switch is easily accessible on the way into the kitchen.

The soft brilliance of the restaurant and the office across the way undoubtedly make strong first impressions. The office, also open on

(Continued on page 133)

Don't type it — tape record it instead

This article should be especially helpful to the following readers:
Electrical Contractors ✓
Electrical Utilities ✓
Electrical Wholesalers ✓
Electrical Inspectors ✓
Industrial Engineers ✓
Consulting Engineers ✓

By Fred W. Goette, III, Stewart-Goette Electric Co., Macon, Ga.

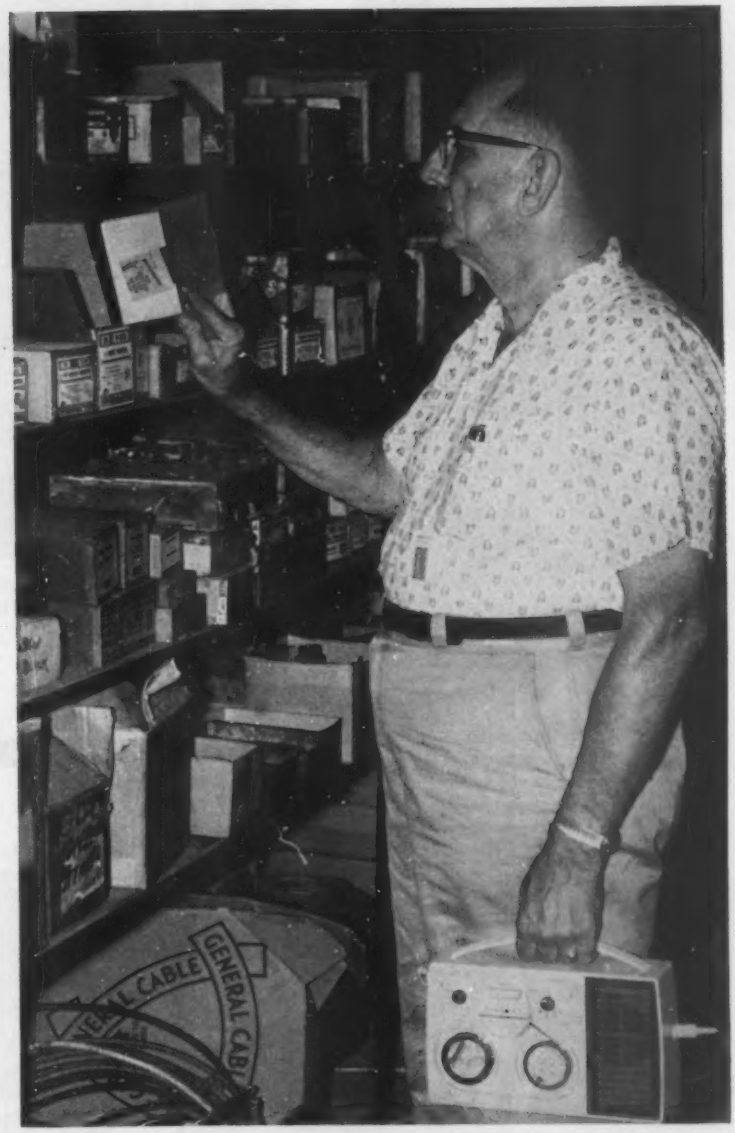
◆ Bill Mixon, manager of Central Electric, lifted the telephone from its cradle and said, "Central Electric, Mixon speaking."

With all the speed—and none of the diction—of a female Walter Winchell, the voice at the other end replied, "This is Mrs. Charles O'Brien at 745 Crestwood Drive. Please send an electrician to my house to repair the yard lights and while he is here check the wall outlet in the master bedroom and put in one of those round lights in the kitchen. I won't be here this afternoon so I'll leave the key in the mail box. You just go ahead with the work."

"Thank you very much, Mrs. O'Brien. We'll have a man at your house this afternoon," Mr. Mixon said, and hung up the phone.

As you well know, such a conversation is hardly possible. Ordinarily the customer would have to be asked to repeat all of her instructions slowly so they could be written down. But Mr. Mixon had some electronic help in the form of a modern tape recorder. Tape recorders have been around a good while, but only recently has the size of the units been cut to the point that recorders can really be called portable. Portability is a prime requirement in business use and the transistor made it possible.

Many transistorized recorders, weighing less than five pounds and powered by flashlight batteries, are now on the market. The sensitivity and tonal quality of these midget electronic miracles must be heard to be appreciated. With the microphone lying on a desk, every word uttered in a medium sized office will be permanently recorded.



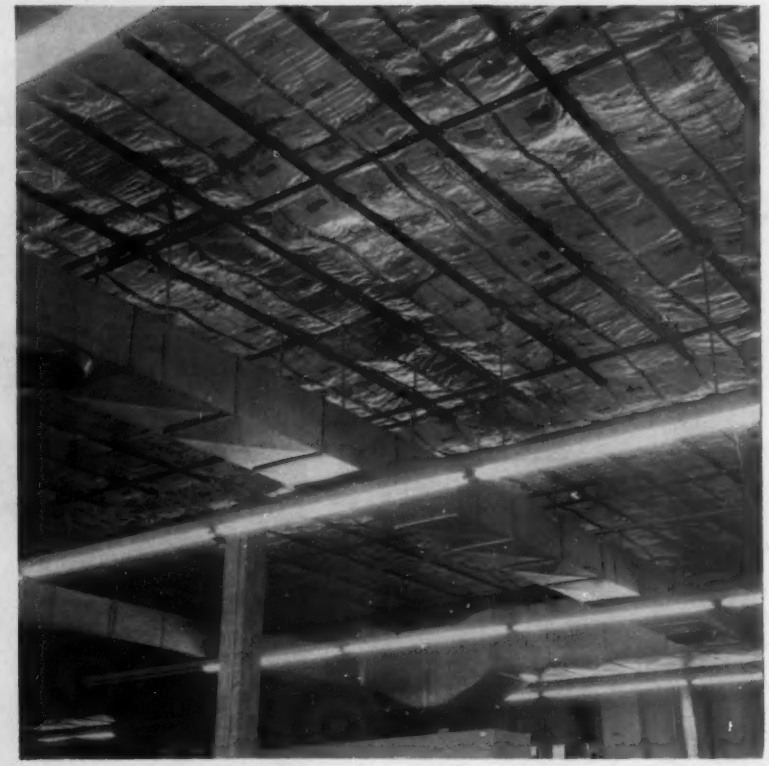
Using a tape recorder can cut the time normally required for inventory in half. Information is later transcribed to the inventory book.

After using a portable tape recorder for a short time, a multitude of possible uses will occur to you. The portable recorder can go along with you to the architect's office. It will preserve all the instructions you receive from him, your customer, and the job engineer. Its use completely obviates the usual distracting note-taking with pencil and note paper and, upon returning to your office, all interested can be fully informed in one short session.

Another very useful application for the tape recorder is as a mechanical note taker on job inspections. The recorder will remember all the parts that need to be or-

(Continued on page 132)

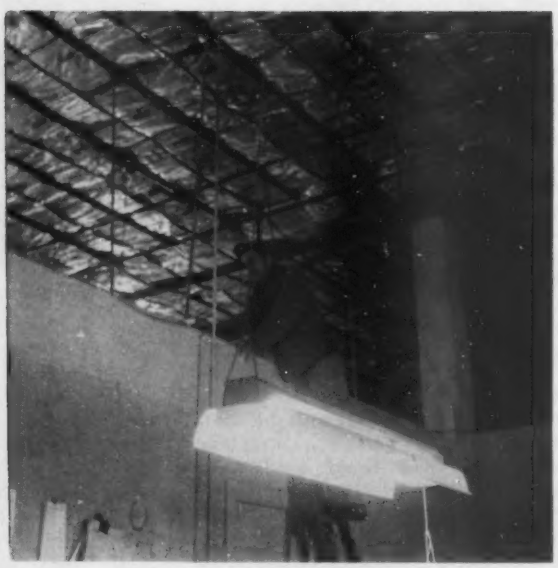
A device was designed to facilitate the fast drying of newsprint. The four-arm portable dryer spans pallets loaded with newsprint, with heat coming from infrared lamps.



Wiring was brought down to fixtures from a pancake box supported by a 3/8-inch crow's foot through the fixture stem. There are six such lights.

Contractor expedites

Office lights put up with 1/4-inch rods presented a maintenance problem after ceiling was installed.



The maintenance of these office lights was solved by mounting the connection boxes on an outside office wall.

Romeo Catilena of Maisel Electric Company is pointing to resplicing points in the reassemblage of conduit at the printing plant presses.

printing plant's move

A quick relocation was necessary, and better lighting and a newsprint drying system had to be installed

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electrical Utilities ✔
- Electrical Wholesalers ✔
- Electrical Inspectors ✔
- Industrial Engineers ✔
- Consulting Engineers

By Romeo Catilena, Master Electrician, Maisel Electric Co., Inc., Washington, D. C.

◆ We were faced with a problem: moving a printing plant—including a photograph processing laboratory—from two locations in four- and two-floor buildings to a one-floor operation, as quickly as possible.

This moving meant disconnecting machinery comprising two large color presses, folders, stitchers, cutters, and binders, as well as large photographic processing equipment.

It also meant getting lighting into the new building as fast as possible to meet incoming equipment, with a minimum of interruption and loss of time to our customers.

We had to work as fast as the crew of riggers dismantling the equipment. The presses and machines could not be moved as single units but had to be taken in sections.

To facilitate the reassemblage of equipment for operation as quickly as possible, we used bands marked from one to 50 at the cut-off sections.

We gave each machine a number, and the controller, the magnetic starter, and all troughs and switches the same identifying number. All wiring was clearly marked and lettered in non-erasable ink.

Moving floor by floor, we assorted units, relocated conduit, and switches by their identifying numbers in the areas designated for the machines, and then reassembled quickly. Conduit could thus be put back where it was located originally, and parts could be respliced when set in place.

As a former warehouse with a 20-foot ceiling, the new location presented lighting problems. Increased candlepower at desk level was necessary for this type of operation. Working from a slotted webbed beam system that supported the roof, we placed a ⅜-inch crow's foot in the slotted beam, and suspended the fixture stem from it. In this one-inch slot the fixture stems were adjustable to proper position.

Wiring was brought down from a pancake box supported by a ⅜-inch crow's foot through the fixture stem. There were six such lights. When the stems were in proper position, we raised the fixtures onto the stems, locknutting them into place. A canopy covered studding and the pancake box.

Office lights presented a different problem. Here the four four-foot fluorescent louvered pan fixtures were put up with ¼-inch rods suspended from an eight-foot ceiling. When the rods were up and acoustical ceiling installed, the problem of future maintenance was solved by mounting connection boxes on the outside office wall. Thus, they were accessible to repair.

When the ¼-inch rods did not fit into the slotted webbed beam structure, we used tubing. Flattened on each side, drilled and bolted to the overhead rods, tubing was used where no beam existed.

We were called on to meet a need—the fast drying of newsprint by means of heat—for which we could find no existing piece of equipment. We designed and installed a four-arm portable dryer spanning pallets loaded with newsprint, three feet wide and eight feet high, with heat coming

(Continued on page 132)

Fred S. Plant, left, is laying out the third basement electrical heating job his firm sold in one week. Extensive advertising helps sales. The philosophy of the highly successful firm is to stress and sell indoor comfort, instead of electrical wiring and package kitchens.

Good living

Advertising

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electrical Utilities ✔
- Electrical Wholesalers ✔
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers

By S. W. Ellis, Electrical South Field Editor, Little Rock, Ark.

◆ Sales experience gained the hard way in a small backyard electrical contracting business is now working profitably for a young contractor who sells several electrical heating jobs each month, plus wiring for air conditioning, all-electric kitchens, and commercial and industrial construction.

Until a year ago, Fred S. Plant, Little Rock, Ark., operated as the Plant Electric Co. He now does business under a name and in a location capturing the interest of

The reception room in the Indoor Comfort, Inc., building is comfortable and professional looking.

stressed by Indoor Comfort, Inc.

and enthusiasm help to push the sale of electrical heating equipment

everyone interested in good living —Indoor Comfort, Inc.

As manager of the electrical contracting division of this enterprise, which offers from one telephone number and under one roof a one-stop shopping service for electrical wiring, air conditioning, plumbing, and complete kitchens, Mr. Plant uses personal salesmanship and advertising to promote fast-growing popularity for electrical heating.

Indoor Comfort, Inc., does business from a new building, served by its own large parking area, where its 30-truck fleet shares space with the trucks of builders and general contractors and the cars of prospective home builders who have been made conscious of good indoor living through the impressive advertising of this one-stop service center.

Giant billboards, at such strategic points as the foot of a bridge and the entrance to stock show grounds and amusement parks, command interest for the one-stop service that the firm offers.

Television weather programs, in cold weather, carry an illustrated message of electrical baseboard heating. In midsummer, air conditioning is featured.

Newspaper and telephone directory advertising also promotes the multiple service behind the name.

"Our plan," said Mr. Plant, "is to sell indoor comfort, not merely electrical wiring and package kitchens. The name under which we operate, Indoor Comfort, Inc., is registered. No one else can use it. The name and our much-publicized telephone number that gives one-stop service are part of our organized plan to interest people in all-electric living.

"When I make a personal call to sell baseboard panel heating, it is a great help to know that the name, Indoor Comfort, Inc., has already made an impression on the prospect."

An important part of the publicity plan are the trucks, all painted a uniform grey, with the name in striking evidence and the telephone number easily read. These trucks are regarded as rolling billboards that attract attention in a wide area.

Mr. Plant devotes much of his time to personal contacts with prospects. The only way to sell electrical heating, he contends, is to sit down with the prospect and convince him that baseboard panel heating is today's best buy in comfort, safety, and well-considered economy.

No electrical contractor in the area is a more enthusiastic nor a better-informed salesman for baseboard heating than Mr. Plant. He insists that it is practically trouble-free, with an installation cost that cannot be surpassed for economy where comfort is weighed.

Three heating jobs sold

"This week I sold three electrical heating jobs," he said. "At a cost of from $650 to $700, these three-bedroom homes will have baseboard electrical heating exclusively. I also have nine other

(Continued on page 130)

The firm's attractive trucks are uniformly painted, with the registered name prominently displayed.

All-electric house has 100 motors

Unique today, this 'automated home' may be typical of what the future will hold in the way of wiring prospects for the contractor

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electrical Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors ✓
- Industrial Engineers
- Consulting Engineers ✓

◆ Utilizing more than 100 small electric motors, many doing unusual jobs, a new ranch-type home located in a quiet residential section of Fort Wayne, Ind., brings maximum automation into the home for better living.

The attractive, all-electric, Gold Medallion home contains a number of work-saving, motor-powered ideas which can be included in new-home and home-modernizing plans.

Owner of the unusual home is Lisle Hodell, general manager of General Electric's General Purpose Motor Dept., Fort Wayne.

Motors provide the power as bunk beds are lowered from the wall, they drive a conveyor moving ashes from the fireplace to the flower bed, and open and close the drapes covering large glass doors surrounding a central patio.

Of course, motors also perform more conventional jobs in this well planned home. A motor provides power for a waterfall in the decorative patio well. The central vacuum cleaning system, which requires only that the hose attachment be plugged in the wall, receives its power from a fractional-horsepower motor drive.

Many modern homes have up to 30 motors. Yet, the homeowner often doesn't realize this because motors are built-in or hidden like those found in refrigerators, clothes driers, and air conditioners.

Bringing the total motors to over 100 in this unusual home, the owner has thought twice before buying routine hand-powered devices or solving living problems.

When the fireplace fills up with ashes, owner Lisle Hodell pushes a button and this auger device hauls them conveniently under the floor to the garden.

Motor-driven bunks come down from, and return to, the playroom wall. Mr. Hodell is demonstrating this unique feature of the house to a great-niece and great-nephew.

For example, his desk in the library contains a motored powered eraser and pencil sharpener, a vibrator motor on his desk chair, and a motorized dictating machine in a desk drawer.

In the bathroom are an exercise machine, a small refrigerator, and a motorized toothbrush. "While some people might think I have gone overboard," remarked Mr. Hodell, "I think the 'home of tomorrow' will be even more automated than mine!"

Reflecting on his 44 years of experience in the small motor business, he commented that "everyday we see new devices designed to save work or bring us more comforts in the home. The 100 motors working for us in our home could be expanded even now and that's without counting the tiny motors on our seven clocks or the 15 electric motors in my car."

The conservatively decorated nine-room, two-bath home is occupied by the Hodells and their housekeeper. Three sets of grandchildren come to see them quite often and are the reasons for the motor-powered bunk beds. The kids love them. Push a button and down comes a bed out of the wall. Push another button and up it goes.

The "kids' room" is a feature of this unique house. On demand it quickly transforms from an extra bedroom to a playroom or to a garage. In each case it is complete as the convertibility of equipment testifies.

For example, the garage door becomes an insulated wall and the beds disappear. As a garage, the large door is opened or closed by touching a button in the car and a motor-driven door operator is activated electronically.

The kitchen, normally the center of the homemaker's daily activities, leads all other rooms with 22 motors. These include three motors in the refrigerator-freezer, two in the room air conditioner, and one each in the dishwasher, dishwasher timer, disposal, oven timer, rotisserie, mixer, blender, can-opener, meat and salad grinder, toaster, deodorizer, knife sharpener, coffee grinder, vent fan, the clothes washer and dryer, and a motor to operate the curtains.

Motors provide convenience such as the master control panel in the living room with finger-tip control for all drapes and lights in the home. A sweep motor searches out all operating circuits and turns them on or off as desired.

Electric motors in unique home

Kitchen
Refrigerator — 3 motors
Disposal
Dish washer
Timer
Washer - dryer
Timer
Vent fan
Oven timer
Rotisserie
Room cooler — 2 motors
Mixer
Coffee grinder
Can opener
Meat - salad grinder
Knife sharpener
Blender
Toaster motor
Curtain motor
Deodorizer

Dining room
Curtain motor
Fan

Library
Stereo pick-up
2nd turn table
Movie projector
Slide projector
Ediphone
Lamp clock
Pencil sharpener
Eraser
Sequence control
Vibrating chair
Fan

Living room
Fireplace
Room cooler — 2 motors
Fan
TV control
Curtain motors — 2

Patio
Water pump
Evaporator cooler
Spin sect (bugs)

Baths
Vent fans — 2 motors
Heaters — 2 motors
Hair dryer
Refrigerator
Condenser
Shaver
Shaver—ladies'
Electric tooth brush

Bed room #1
Room cooler — 2 motors
Exerciser
Vibrator
Sewing machine
Curtain motor
Twin-bed vibrator — 2 motors

Bed room #2
Cooling fan

Hall & attic
Attic fan
Attic vent fans — 2 motors

Utility room
Central vacuum
Lawn mower
Lawn edger
Floor polisher
Hedge clipper
Lawn trimmer
Vacuum cleaner
Circulating fan

Garage
Door opener
Shoe polisher
Record player
Beds — 2 motors

Workshop
Band saw
Tool grinder
Buffer-polisher
Sander
Drill press
Hand drill
Bench lathe
Air compressor
Engraver
Pick up cleaner
Fan
Large drill press
Portable saw
Jig saw

Toys
Large engine
Small engine
Passenger engine
Mecano motor
Boat

Misc.
Christmas tree turner
Vacuum clothes brush
Hat brush

The latest in built-in hi-fi and stereo sound equipment is also installed in the home. Few people think of a record player in connection with an electric motor, but the motor is required to drive the turntable. The motor replaced the old hand crank on record players just as it did on the automobile.

For patio comfort, a portable evaporative cooler sprays a delicate, aromatic insecticide, keeping mosquitoes at a safe distance. A companion device located in the flower garden attracts insects with "black" light, whereupon a suction fan pulls them into a disposable plastic bag.

Lawn work and gardening is al-

(Continued on page 134)

Application of quartz iodine lamps

Outside illumination at the South Windermere Shopping Center is shielded from passing motorists' eyes and does not obscure store facades.

This article should be especially helpful to the following readers:

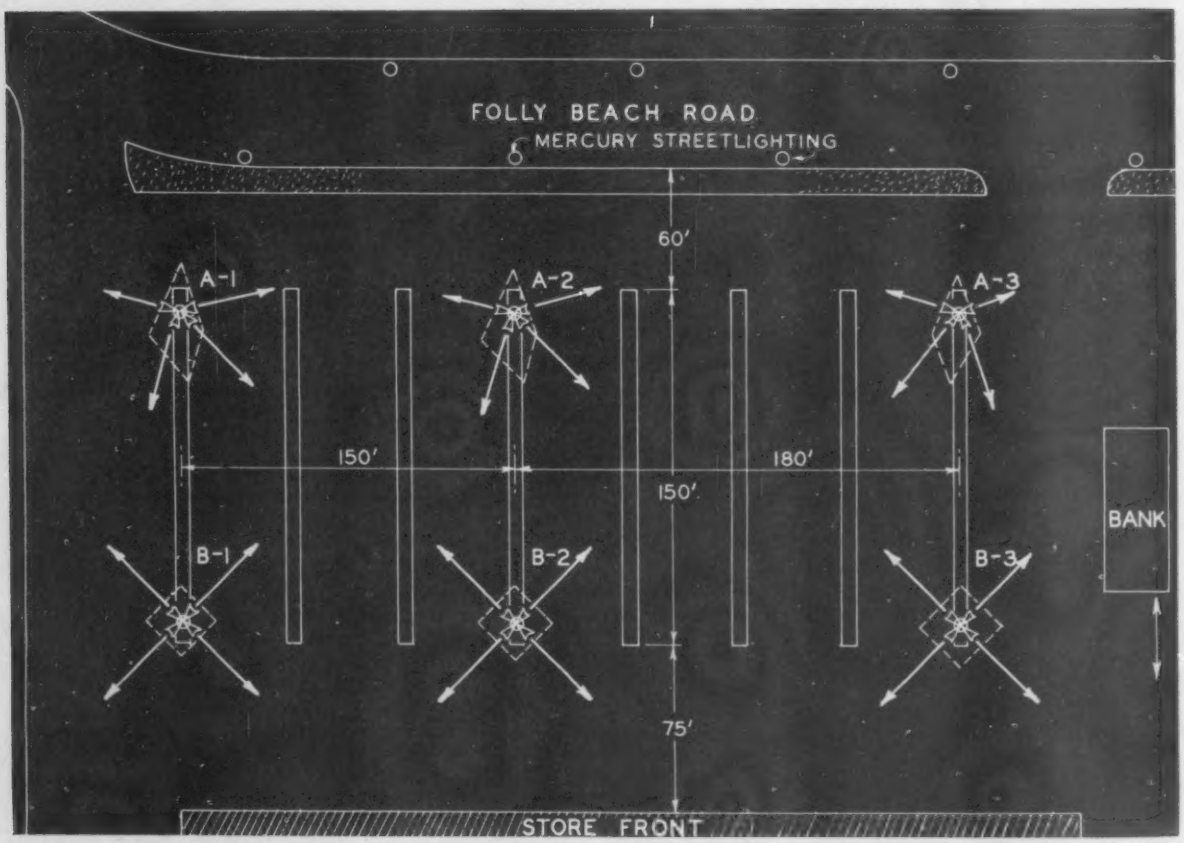
- Electrical Contractors ✓
- Electrical Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers ✓

By Logan VanLeigh, Field Engineer, Appleton Electric Co., Atlanta, Ga.

◆ Dissatisfaction with the existing parking area lighting prompted the owners of South Windermere Shopping Center, Charleston, S. C., to begin to search for something new.

What they called for was not all they actually wanted, and the

(Continued on page 133)



This drawing of the parking area in front of the shopping center shows the location of lighting standards.

"I'm a twenty-year man, myself..."

"I've been using the Payroll Savings Plan since we first put it in."

"Twenty years ago I had the best intentions and the worst performance on thrift you ever saw. I was always starting regular savings, *next payday*. Then I signed up for our company plan for buying U. S. Savings Bonds on systematic deductions and things really began to happen. For a man like me the savings allocation has to be taken out first, and our Plan does just that. Like so many of our people around here, I've stayed right with the Plan since the day we set it up."

If your company now has the Payroll Savings Plan in operation, you will find you can increase the percentage of employee participation by reminding every member of your staff that this well-proved method of automatic saving is available. If you do not now have the Plan, contact your State Savings Bonds Director and get his experienced cooperation in getting a Payroll Savings invitation to each employee.

NOW! U. S. SAVINGS BONDS EARN 3¾%

20th ANNIVERSARY 1941 1961

ELECTRICAL SOUTH

THE U. S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY DEPARTMENT THANKS, FOR THEIR PATRIOTISM, THE ADVERTISING COUNCIL AND THE DONOR ABOVE.

Deep-baffled downlights in lobby create interesting floor effect and echo outdoor lighting pattern.

NEW ADDITION—Eight-lamp 40-watt 4′ x 4′ recessed Day-Brite MOBILEX® fixtures deliver 100-110 footcandles, create inviting atmosphere for customers in main banking area.

OLD BUILDING—MOBILEX® in long rows give a feeling of spaciousness, offset columns that contrast with adjacent main banking area.

First National Bank of Florence, Ala. Architect: *Northington, Smith & Kranert;* Electrical Engineer: *Hazzard, McRoy & Cone;* Contractor: *Verbon Jones Electric Co.*

How Day-Brite helped the First National Bank of Florence blend something old with something new

The modern new addition to the First National Bank of Florence, Alabama, is an outstanding example of efficient, functional design. As is often the case, special problems arose when the older structure was remodeled to blend harmoniously with the addition.

Lighting, for example, had to match the new section in appearance and efficiency, yet fit the existing structural conditions of the old building. By specifying Day-Brite, remarkable results were achieved with standard fixtures. In addition to high-quality, low-glare illumination and a pleasing contemporary design, Day-Brite offered the necessary flexibility of installation.

Next time you're faced with a lighting problem, remodeling or otherwise, give yourself the added advantage of working with the "nation's largest." Phone your Day-Brite representative. *Day-Brite Lighting, Inc., 6260 N. Broadway, St. Louis 15, Mo., and Santa Clara, Calif. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ont.*

Write for FREE booklet on **Modernization and Relighting:** Day-Brite Lighting, Inc., 6260 N. Broadway, St. Louis 15, Mo.

DAY-BRITE

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

Contractors tell how

Ad program ups business 300 per cent in two years

By C. Don Snyder, Owner-President, Wetherbee Electric Co., Oklahoma City, Okla.

◆ We're more than happy with an ad program we've been using — it has increased our small job and residential wiring business 300 per cent in the last two years; 250 per cent in the last 18 months.

I believe helter-skelter advertising is worse than none at all; but if you know exactly what your objectives are, a carefully planned program developed by a qualified ad agency can do much. It has for us.

Our program works on several fronts — billboards; radio, including singing commercials; TV spots; and our attention-getting salesman's car. The program is focused on residential jobs and reaches these customers.

First, the ad agency suggested we make maximum use of our name — Wetherbee. We had used the emblem of a bee earlier, but the current edition of the "Wetherbee Bee" has become sharply identified with us. And this high identification value of the emblem, which the public sees on TV screen and on the streets, has made the potential customers quite conscious of Wetherbee Electric.

Our salesman's car has more than paid for itself in advertising. We realized that just another car or truck with a sign on it would gain little attention. So two years ago we bought a small foreign car, an Isetta, conspicuous because of its size. We painted it a vivid orange-yellow, a color that stands out in any traffic, and covered it with Wetherbee signs and "bee" decals.

The $1,100 cost has been an excellent investment for us — and not especially because it gets 48 miles per gallon and has proved a very satisfactory vehicle for the salesman's purpose. Mainly because it has proved a strong sales aid.

Our salesman-estimator Phil Johnson contacts homebuilders to secure plans for bidding, and he also supervises residential wiring installations. He has found the little car a first class "opener." The person contacted almost invariably makes some remark expressing interest in the car — many want to go for rides in it.

This brightly painted small foreign car has become a strong sales aid for Wetherbee Electric Co. The car is one of several significant facets of the advertising program followed by the Oklahoma City firm.

The car is a definite part of our planned program. Another example is one of our short TV spots during the late movie, an ad on an automatic electric outdoor lamp. "Lend charm and safety to your home," viewers are told, as a night scene flashes on the screen showing an attractive post lamp lighting a front lawn. And then the commercial states, "All work is guaranteed one year by Wetherbee." And the well-known emblem, the busy-looking bee, is shown.

Wetherbee is one of the oldest firms in the city, founded in 1899, with a long established reputation and name. We feel strongly about our reputation for quality work, and know that we must back up our advertising with performance.

With this in mind, our approach has been to seek an expanding share of the home wiring business, to keep our firm prepared to do a volume of top quality work in this field, and to use the ideas and services of a qualified ad agency to help us get the kind of business we want.

Our ad program has been focused on this home wiring business, and that's where our 300 per cent increase has occurred. We're highly pleased with the program and the results.

Three steps used to make contracts for maintenance

By B. I. Florence, Florence Heating and Air-Conditioning Co., Birmingham, Ala.

After my firm had completed the installation of Typhoon heat pumps totaling 1,036 tons at the new Eastwood Mall shopping center in Birmingham, I was faced

The nearsighted MISTER MAGOO says . . . "1956? A banner year! Princess Grace was married—unfortunately I couldn't attend—and General Electric invented the Power Groove Lamp. Happy birthday, Power Groo—Bowser! drop that salami! You've taken enough bites out of it already!"

© UPA PICTURES, INC.

G-EXCLUSIVE! Power Groove® cuts your customers' initial costs as much as 40¢ a sq. ft.

General Electric Power Groove Lamps start saving your customers' money the day they're specified.

By any standard of comparison, they give more light—with fewer lamps—than any other fluorescent type or brand. If your customers are building or remodeling, Power Groove Lamps *can save them up to 40¢ per square foot of lighted floor area* right off the bat.

Just the beginning. With fewer lamps, fixtures and ballasts overhead, maintenance men spend less time on ladders.

Employees' increased efficiency helps pay for Power Groove Lamps. If every reject makes a customer wince, show him how improved lighting—at no extra cost—might spruce up his operation. Perhaps he can remove the individual lamps that light only machines or tables.

General Electric's 5-year-old secret is in the grooves. They bend a 9-ft. arc stream through an 8-ft. tube and swing it closer to the light-producing phosphor coating. No other fluorescent lamp compares with the Power Groove. Call your General Electric Lamp distributor for more details. General Electric Co., Large Lamp Dept. C-14, Nela Park, Cleveland 12, O.

Progress Is Our Most Important Product

GENERAL ELECTRIC

with the job of figuring ten-year maintenance contracts with most of the 44 tenants owning heat pumps in the shopping center.

The three main steps I took in setting up long-term maintenance contracts seem to me to be basic to any contractor who faces such a problem:

(1) Estimating labor costs ten years in advance in an ever rising wage scale was the most difficult task. I went back over my payrolls for ten years and found that the wage scale for journeymen had doubled in that time, increasing from $2 per hour to $4 per hour.

In the face of existing contracts with the union based on a sliding scale and the history of the past ten years, I could only conclude that the next ten years would see wages double again, or reach $8 per hour by 1970 in my case.

(2) I decided to warehouse at the shopping center a supply of all parts and material that could possibly be needed. This stock had to be kept on hand anyway, and it is better to keep it at the site where it will be used, thus saving many trips to my main warehouse—and saving time for me and for my customer.

(3) On the theory that preventive maintenance is the best, I worked out a plan of daily inspection by my maintenance man on the job at the shopping center. If we can catch something before it goes wrong and prevent a part being replaced or a major repair, then we have come out ahead.

Time cut in half by tape recorder

By John Gabrio, Gabrio Electric Co., St. Petersburg, Fla.

◆ We had completed a $295,000 wiring job on which we had bid on a firm basis. Most of the work had been installed under a unit price, per-foot basis, including such items as conduit, cable trays, etc.

At job termination we were required to determine just how much of the unit price material had been installed over or under the contract specifications, and how many deletions existed for which we had to allow credits.

This posed the time-wasting chore of tramping around the job to check each installation of unit-priced items.

Instead of making the journey in conventional fashion, a foreman carrying a tape recorder made the rounds. Each time he saw a run of pipe not shown on the bid print, he spoke his findings directly into the tape recorder, listing the number and size of wires, the number of terminations, footage of conduits and troughs, etc.

He did the same thing where a run of pipe had been omitted, recording this as a deletion. Since pipe lengths, for example, are ten feet, he could look at the ceiling and estimate complete—or incomplete—runs.

The tape recorder was then returned to the office for transcribing and totaling the additions and deletions for approval.

We figure this job was done in less than half the time required ordinarily.

Ballast relocated to stop humming

By Andrew A. Hines, Anchor Electric Co., Dallas, Texas.

◆ Although it seems an obvious solution to a simple problem, many electricians have apparently not been aware of what is probably the best way to eliminate annoying hum from some fluorescent fixtures.

A customer recently called us out to his residence to do something about the fluorescent fixture in his den which was making a rather loud hum.

He claimed that several electricians had worked on it already and had tried various remedies such as packing the ballast and transformer in sponge rubber, but that nothing had worked satisfactorily.

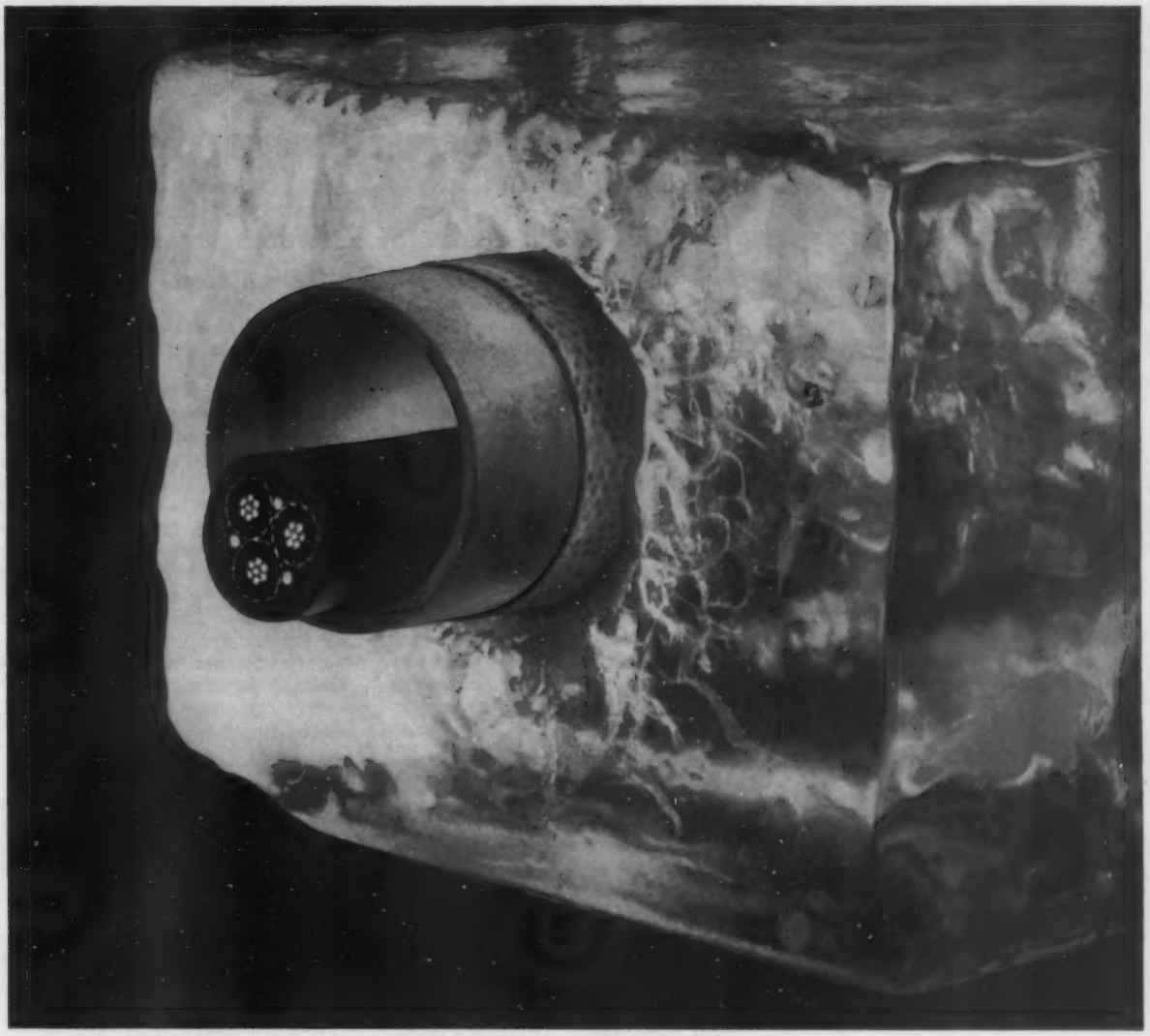
The customer said that he had already spent a considerable amount of money on the fixture, and that he wasn't going to pay us if we worked on the fixture and didn't eliminate the humming noise.

There seemed only one way to quiet the fixture—move the ballast to a remote location. We moved the ballast to such a place in the attic, where it was mounted

(Continued on page 130)

Adjustable base

Telescoping outriggers and instantly adjustable legs provide compensation for irregular surfaces on this new adjustable base for aluminum telescoping work platforms. Called the Tallescope, it is made by Up-Right Scaffolds, Berkeley, Calif.

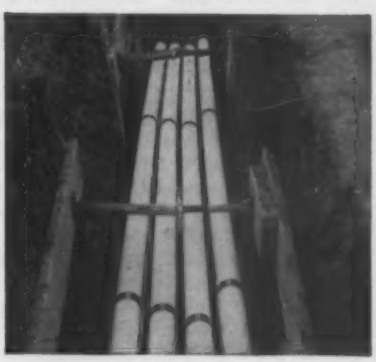


Cooler cables at lowest costs with Transite Ducts!

Do you know that electrical system losses amount to more than four hundred million dollars annually? Research shows that these losses can be drastically reduced by improving the dissipation of heat from conductors under load. The most efficient and economical way to accomplish this is with inorganic Transite® Ducts.

Tests prove that asbestos-cement Transite Ducts can actually have as much as 10.6% greater heat-carrying ability than organic ducts. This means that when a conductor is supplying a given load, its temperature will be substantially lower in Transite. These cooler cables result in lower electrical resistance with correspondingly lower I^2R losses. At a $20/KW cost, this can save you as much as $8.20 per thousand feet a year. Lower operating temperatures mean longer cable life and more reliable service, too!

Because of their 10′ lengths and speedy coupling method, Transite Ducts can be installed at the lowest cost. Get the full story by writing Johns-Manville, Box 14, ES-3, New York 16, N. Y. In Canada: Port Credit, Ontario.



JOHNS-MANVILLE

Application of Code requirements

Examined are the nature of the three main classes of hazardous areas and the two divisions into which each has been divided by the Code

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electrical Utilities ✔
- Electrical Wholesalers ✔
- Electrical Inspectors ✔
- Industrial Engineers ✔
- Consulting Engineers ✔

By Walter R. Stone, Contributing Editor on Code Rules, Utica, N. Y.

◆ A general outline and explanation of hazardous areas and of the different classes, divisions, and groups of such areas was discussed in the last issue of this magazine.

In this issue, we will examine more closely the nature of each of the three principal classes and the two divisions into which each class is divided by the Code.

A Class I location, as defined in Article 500 of the Code, is an area in which inflammable gases or vapors exist in the air, or may so exist, causing a potentially explosive or ignitible mixture.

If such concentrations exist under normal operations, even intermittently; or if such concentrations are likely to occur frequently as a result of maintenance procedures, or because of leakage; or if breakdowns or faulty operations are likely to be accompanied by a simultaneous failure of electrical equipment, then the Class I location is further defined as a Division 1 location.

Code test questions

1. Class I locations include those in which inflammable vapors may be present in the air in quantities sufficient to produce ignitible mixtures. True or false?

2. Class I, Division 1 locations include those in which hazardous concentrations of inflammable gases may exist frequently because of maintenance operations. True or false?

3. Class I, Division 1 locations do *not* include those in which breakdowns of equipment might release hazardous concentrations of flammable gases and might cause also simultaneous failure of electrical equipment. True or false?

4. Class I, Division 2 locations do *not* include those which are adjacent to Class I, Division 1 locations and to which hazardous concentrations of gases or vapor might occasionally be communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clean air and effective safeguards against ventilation failure are provided. True or false?

5. Locations used for the storage of hazardous liquids or of liquified or compressed gases in sealed containers would not normally be considered hazardous unless subject to other hazardous conditions also. True or false?

6. Piping without valves, checks, meters, and similar devices which is used for hazardous liquids or gases:

(a) would not ordinarily be deemed to introduce a hazardous condition.

(b) is a Class I, Division 1 location.

(c) is a Class I, Division 2 location.

Which is correct? a? b? or c?

7. Class II locations are those in which:

(a) hazardous concentrations of inflammable gases are likely to be present only in cases of breakdown or during abnormal operations.

(b) hazardous concentrations of combustible dusts are or may be present in the air continuously, intermittently, or periodically under normal operating conditions.

(c) hazardous concentrations of combustible fibers are manufactured or processed.

Which is correct? a? b? or c?

8. The term, *Division 1 location*, is a term used by the Code to designate:

(a) only areas where hazardous concentrations of gases or vapors exist.

(b) locations which are or which may become hazardous under normal operating conditions whether the hazardous condition is caused by gases, dusts, fibers, or flyings.

(c) conditions which are or may become hazardous only in case of breakdown or other abnormal conditions.

Which is correct? a? b? or c?

9. Locations which are hazardous by reason of the presence of dusts which are both explosive and electrically conducting, such as metallic dusts from magnesium, and locations which are hazardous by reason of the presence of dusts which are explosive but which are not electrically conducting, such as grain dusts, are:

(a) separated by the Code into diferent classes.

(b) separated by the Code into different divisions of the same class.

(c) both included in the same class.

Which is correct? a? b? or c?

10. Class III, Division 1 locations include:

(a) textile mills.

(b) grain elevators.

(c) oil refineries.

Which is correct? a? b? or c?

Correct answers will be found at end of article on page 132.

But since Class II and Class III locations are also further divided into Division 1 and Division 2 locations, it always must be kept in mind which class is associated with which division. (See the outlines and discussion in the February issue of ELECTRICAL SOUTH.)

The fine print note following Paragraph (a) of Section 500-4 lists sample locations which would be classified as Class I, Division 1 locations. These include areas where volatile liquids, gases, or solvents are kept in open tanks or where they are transferred from one container to another; pump rooms; spray painting areas; portions of cleaning and dyeing rooms; gas generator rooms and gas manufacturing plants; and all other locations where hazardous concentrations of gases or vapors are likely to occur in the course of normal operations.

Class I divided

A Class I location is further divided into a Division 2 location if volatile liquids, gases, or solvents are normally confined within closed containers and can escape only under abnormal conditions, such as rupture of the containers, breakdown, or abnormal operation of equipment; if areas have sufficient positive mechanical ventilation to prevent hazardous concentrations of gaseous mixtures but which could become hazardous by failure or abnormal operation of such ventilating equipment; or areas which are adjacent to Class I, Division 1 locations and which, as a result of such proximity, could contain hazardous mixtures from time to time or under abnormal conditions.

The fine print note following Paragraph (b) of Section 500-4 sums it up by stating, in part, that a Class I, Division 2 location is one in which volatile liquids, gases, or solvents are used or kept, but which ". . . in the judgment of the Code enforcing authority, would become hazardous only in case of an accident or of some unusual operating condition . . . ."

Areas containing volatile liquids, gases, or solvents more hazardous or more likely to become hazardous than this are classified as Class I, Division 1 locations.

In some types of occupancies, certain Class I areas are classified by the Code as being either Division 1 or Division 2 locations. These are classified in relation to the special occupancies dealt with more specifically in Articles 510 through 517.

In occupancies other than the ones so covered by these articles, however, the Code enforcement authority must decide what is the extent of the hazardous areas and the degree of hazardousness. This is more difficult in Class I locations than in Class II or Class III because of the unpredictable movements of gases which are affected by wind currents, terrain, and temperatures, as well as by specific gravities.

In areas where gasoline vapors or butane would settle near the ground, natural gas might be wafted away by light breezes. Casinghead gas has been known to follow a ditch for a quarter of a mile and be ignited by a locomotive, then act as a fuse for carrying the blaze back to the casinghead tank.

Other vapors which would normally settle near the ground within a given area are at times carried far beyond such horizontal boundaries by unusual wind currents, or they may rise above their expected vertical boundaries by reason of an increase in temperature.

Allowances, within reason, are made for such variations, such as by setting a five-foot vertical boundary where the maximum expected height for a given vapor to rise would be 2½ feet, or by setting a 25-foot horizontal boundary in areas where vapors would be expected to travel not more than ten feet.

In spite of this precaution, however, such arbitrary boundaries are not infallible, and abject faith and dependence upon them as though they were sometimes results in what are often termed "freak accidents."

On the other hand, it would be impossible to set standards which would guarantee protection against every conceivable danger. But even after so-called reasonable precautions have been taken, a certain degree of wariness is usually justified, especially under unusual conditions.

Boundaries of 25 feet

As a general rule, in areas which are not specifically classified by the Code, most inspection authorities accept 25-foot horizontal boundaries for most gases, five-foot vertical boundaries for atmospheres containing cyclo-propane, ethyl-ether vapor, and other vapors in the Group C category, and 18-inch vertical boundaries for gasoline, naphtha, lacquer solvents, natural gas, and similar gases in the Group D category. (See the February issue of ELECTRICAL SOUTH for a discussion of the various group classifications.)

For areas outside of buildings where the inside of such buildings are classified as Class I, Division 1 locations, some inspectors classify as Class I, Division 2 those areas within 25 feet of doorways, and of windows which have openings as low as the upper edge of the vertical boundary; others include areas within 25 feet of all windows or other openings in the outside walls; and still others, influenced by tests reputedly made by the Army Engineers, classify as Class I, Division 2 an area outside of the building extending beyond the sides a distance equal to the width of the building and extending beyond the end a distance equal to the length of the building. See Figure 1.

Areas within these boundaries have, or are likely to have, vapors which are not readily carried away and dissipated by wind currents.

Where areas are not specifically classified by the Code, vertical boundaries are less standardized by enforcement authorities than horizontal boundaries. Most inspectors set the vertical boundary at a certain distance above the grade, depending on the gas which is present. With petroleum

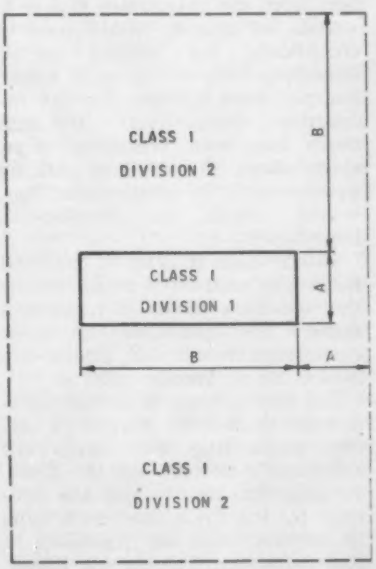


Fig. 1—Method of arriving at horizontal boundary of a Class I, Division 2 location by some inspectors. Dimensions A and B of Class I, Division 1 building determine Class I, Division 2 surrounding area.

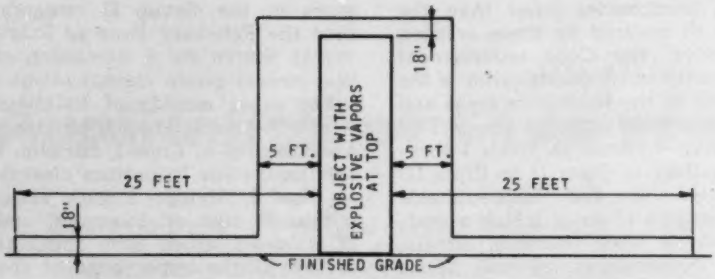


Fig. 2—This shows how some inspectors determine area to be classified as hazardous around and above object with explosive vapors at top.

vapors, this is usually 18 inches above the grade.

A few inspectors elevate this boundary according to the general contour of the buildings, tanks, piping, or other objects where vapors are or may be present at or near the tops of such objects. Of the latter group, some begin the elevation within 25 feet of the object. See Figure 2.

Others begin it at only five feet from the object, which takes into consideration the likelihood of greater wind currents than would be expected on or near the grade. See Figure 3.

It would seem that a compromise of these two methods would not be unreasonable in which a boundary could be set in the shape of a 45-degree cone with a radius at the top five feet from the object, and at the bottom 25 feet from the object. See Figure 4.

This, of course, would tend to complicate the setting of a boundary and, as far as I know, has not been adopted by any inspection authorities, although there has been occasional comment about the drift of settling gases which, if compensated for, would result in cone-shaped boundaries.

In any case, it is up to the local inspection authority to determine the boundary limits of hazardous areas. The practices of some authorities mentioned above are indicative of trends only.

But the authorities having jurisdiction should be consulted before proceeding with areas not specifically defined by the Code. Fortunately, most areas are covered by the Code, and each type so covered will be discussed in this department in coming issues.

Class II locations are hazardous by reason of the presence of combustible dusts. Areas are classified by Section 500-5 as Class II, Division 1 locations if combustible dusts are or may be in suspension in the air continuously or intermittently in mixtures sufficiently dense to be or become explosive or ignitible under normal operating conditions; where failure or abnormal operation of mechanical equipment could cause such mixtures and at the same time cause simultaneous failure of electrical equipment or its protective devices; or where electrically conductive dusts are or may be present.

The fine print note following Paragraph (a) of Section 500-5 lists sample locations which are designated as Class II, Division 1 locations.

These include the following: grain handling and storage plants; rooms containing grinders, pulverizers, cleaners, etc.; conveyors, spouts, open bins, hoppers, mixers, blenders, etc.; dust and stock collectors or distributors and all other dust producing equipment in grain, starch, sugar pulverizing, malting, hay grinding, and similar plants; coal pulverizing plants; and all working areas where metal dusts and powders are produced, handled, stored, etc.

Dusts which are combustible but non-conducting are listed also by the fine print note and include grain dusts, pulverized sugar, cocoa, dried egg and milk powders, pulverized spices, starch, pastes, flour, oil meal from beans and seeds, hay, and similar organic materials.

Non-metallic dusts which, nevertheless, are conductive include pulverized coke, coal, and charcoal. The final sentence of the note states, "Metallic dusts from magnesium, aluminum, and aluminum bronze are particularly hazardous and every precaution must be taken to avoid ignition and explosion."

I have personally witnessed test explosions of equal amounts of grain dusts and aluminum

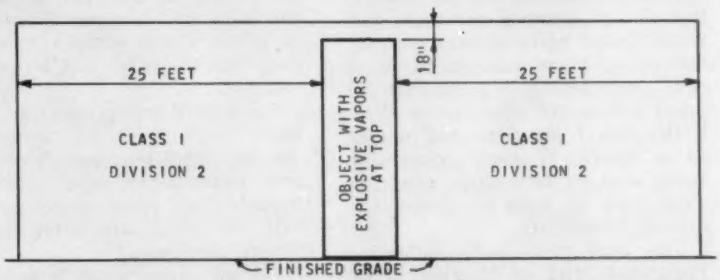


Fig. 3—Some inspectors feel that the area to be classified as hazardous in the arrangement shown in Fig. 2 should be modified as shown here because of the effect of wind currents. The hazardous area extends five feet around the object for the full height plus 18 inches. Beyond this, the hazardous area extends 25 feet around the object for a distance of 18 inches above the finished grade line. See text.

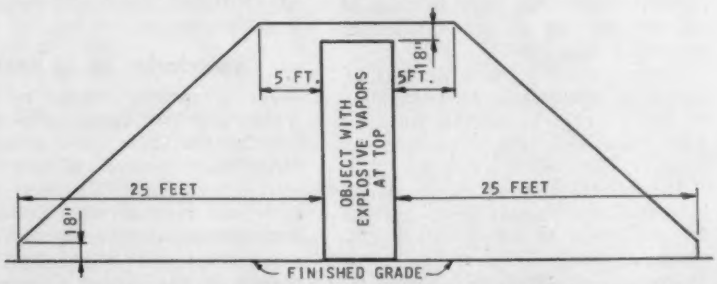


Fig. 4—Another variation for determining the hazardous area around an object with explosive vapors at top. Here, a cone shaped boundary is established which compensates for drift effect of settling gases.

dusts. Judging from the resulting noise made by each, I would estimate the aluminum dust to be at least twice as powerful as grain dusts in explosive force. And it might well be remembered that some very effective incendiary bombs were made of magnesium.

Class II, Division 2 locations, by the requirements of Section 500-5, are areas where combustible dusts, under normal operations, are neither in suspension nor likely to be thrown into suspension in explosive or ignitible quantities but where accumulations of dusts may interfere with the dissipation of heat from electrical equipment, or where such accumulations could be ignited by arcs or sparks from such equipment.

The fine print note following Paragraph (b) of Section 500-5 lists sample locations which are classified as Class II, Division 2.

These include the following: closed conveyors, closed bins, closed hoppers, etc.; equipment from which hazardous quantities of dust could escape under abnormal operating conditions; areas adjacent to Class II, Division 1 locations which, under abnormal conditions, could become hazardous; rooms where hazardous concentrations of dust are normally prevented by effective dust control equipment; and areas where dust producing substances are in closed containers only.

Class III locations

Class III locations, by the provisions of Section 500-6, are areas which are hazardous by reason of the presence of easily ignitible fibers or flyings but where such material is not in suspension in the air in sufficient quantities to form explosive or ignitible mixtures.

Class III, Division 1 locations are areas where easily ignitible fibers or material which produces easily ignitible flyings are manufactured, handled, or used. Samples of such locations are listed in the fine print note following Paragraph (a) of Section 500-6. These include textile mills, fiber manufacturing and processing plants, cotton gins, cotton seed mills, flax processing plants, clothing manufacturers, and woodworking plants.

This note also lists samples of easily ignitible fibers and flyings. These include the following: rayon, cotton, cotton waste, jute, hemp, cocoa fiber, oakhum, baled kapok, spanish moss, and excelsior.

Class III, Division 2 locations, by the provisions of Section 500-6, are areas where easily ignitible fibers

(Continued on page 131)

Questions on the Code

(Readers are invited to send in questions which they would like to see discussed in this department.)

What type wiring meets criterion of protection?

QUESTION: What kind of wiring or protection to the wiring would meet the intent of the term "or be otherwise suitably protected from physical damage" in Section 725-17?

ANSWER: This section states, "Mechanical Protection of Remote-Control Circuits. Where damage to a remote-control circuit would introduce a hazard as covered in Section 725-6, all conductors of such remote-control circuits shall be installed in conduit, electrical metallic tubing, type MI cable or be otherwise suitably protected from physical damage."

In all such cases as this where terms such as the one employed here are used, it is left to the judgment of the inspection authority to decide whether an installation complies with the Code rules and intent.

The question, as you have stated it, boils down to this: What constitutes protection to the remote-control conductors equal to that which would be provided by rigid conduit, EMT, or type MI cable? But this kind of question cannot be answered in the usual sense, because there may be thousands of ways or none whatsoever which will offer, in the opinion of the inspector, equal protection.

Everything depends upon the particular installation — and the inspector. This sort of answer, then, can come only after the installation has been completed. Therefore, the contractor who chooses to provide "equal" protection, instead of using one of the three specified wiring methods, is entirely at the mercy of the inspector who, after seeing the completed installation, must decide whether *this* job, as installed, meets the intent of the Code.

Unless there is a good reason for doing otherwise, and there seldom is, one of the specifically recognized wiring methods for any given type of installation should be used. But if a reason for not doing so does exist, it is best in such cases to consult the inspection authority having jurisdiction and ask him whether a specific substitute will be acceptable to him.

I suspect that you would like to use an armored cable, or perhaps even some type of non-metallic sheathed cable for this purpose. Both are being used rather profusely for such critical remote-control circuits now.

I do not know of any areas where non-metallic cables are acceptable to inspection authorities, but there are instances where such authorities have accepted armored cable for this purpose.

Section 725-17 of the Code, however, as it is now written, does not permit armored cable for remote-control circuits " . . . to safety-control devices, the failure of operation of which would introduce a direct fire or life hazard. . . . " as this type of circuit is defined in Section 725-6.

Where does inspector get requirement of pipe size?

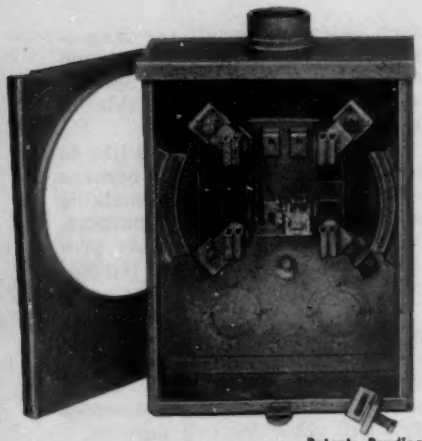
QUESTION: I have a new installation in which I ran three No. 250 MCM and one No. 4/0 in a 2½-inch conduit. The inspector said that a three-inch conduit was required for this installation.

Since Table 1 of the Code does not give pipe sizes for combinations of various size wires, I used Table 5 to get the conduit size. I used TW wire which had a total area of 1.8535.

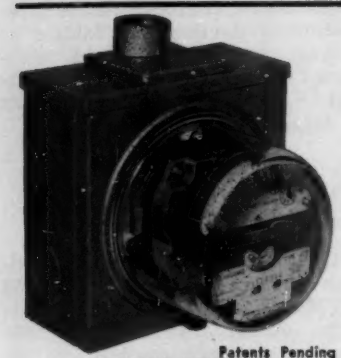
For 40 per cent fill permitted by Table 3, Table 4 shows that 40 per cent of a 2½-inch conduit is larger than my wire size. Where in the Code could the inspector be getting his three-inch pipe size requirement?

ANSWER: The last paragraph of the note at the bottom of Table 5 states, "The dimensions of rubber-covered conductors in Column 3 of this Table are to be used in computing the size of conduit or tubing for new work for combinations not shown in Table 1. The dimensions in the last column of this Table may be used only for rewiring existing raceways." (The last column is the TW column which you used.)

Section 346-6 (and also, by reference, Section 348-6) states this same requirement. By using the dimensions of rubber-covered conductors, the three 250 MCM and one 4/0 conductors have a total area of 2.2591 square inches. This requires a three-inch conduit.



Patents Pending
CATALOG SL-AL-100FH-1 1/4"
Size 10 1/2" x 8" x 3 5/8"
4 Terminals—100 to 120 Ampere
Aluminum Extruded Connectors



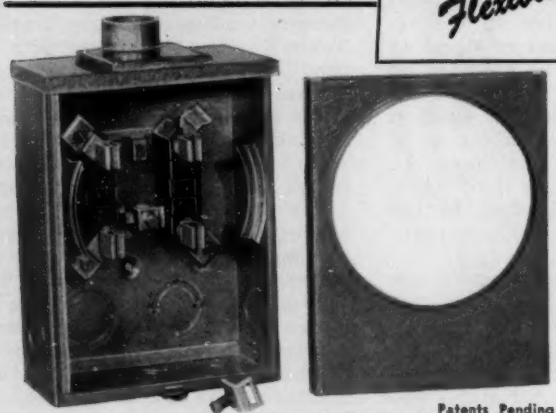
Patents Pending
CATALOG WV-011-A-1-1/4"
Size 8" x 8" x 3 5/8"
4 Terminals—100 to 140 Ampere
Standard Copper Connectors

LOOKING for Something?

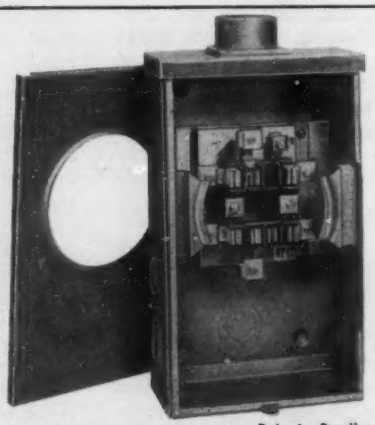
Designed for the Application

B & C'S ORIGINAL RINGLESS METER SOCKETS
LIGHT DUTY, MEDIUM DUTY, HEAVY DUTY SOCKETS
SINGLEPHASE, POLYPHASE, COMBINATION DEVICES
HORIZONTAL GANG, VERTICAL GANG, SOCKET UNITS
INDOOR AND OUTDOOR TRANSFORMER CABINETS
COMBINATION TRANSFORMER - METER ENCLOSURES
UNIQUE TRANSFORMER MOUNTING BRACKETS
OUTDOOR AND INDOOR METERING ENCLOSURES
SERVICE MAST CLAMPS AND OTHER ACCESSORIES
INDOOR AND OUTDOOR METER CONNECTING CABINETS
METER SOCKET ACCESSORIES, PARTS, SPECIAL DEVICES

B & C's Revolutionary, Unique, Designs Flexible, and Unexcelled in Performance Keeping Pace With the Electrical Industry



Patents Pending
CATALOG WVL-AL-0100A-1 1/4"
Size 10 1/2" x 8" x 3 5/8"
4 Terminals—100 to 120 Ampere
Aluminum Extruded Connectors



Patents Pending
CATALOG WVHDP-AL-2007A-2"
Size 17" x 10" x 5 1/2"
7 Terminals—150 to 200 Ampere
Aluminum Extruded Connectors

Write for descriptive catalog containing installation data and current price list.

B and C

Your Seal of Dependability and Safety

METAL STAMPING COMPANY

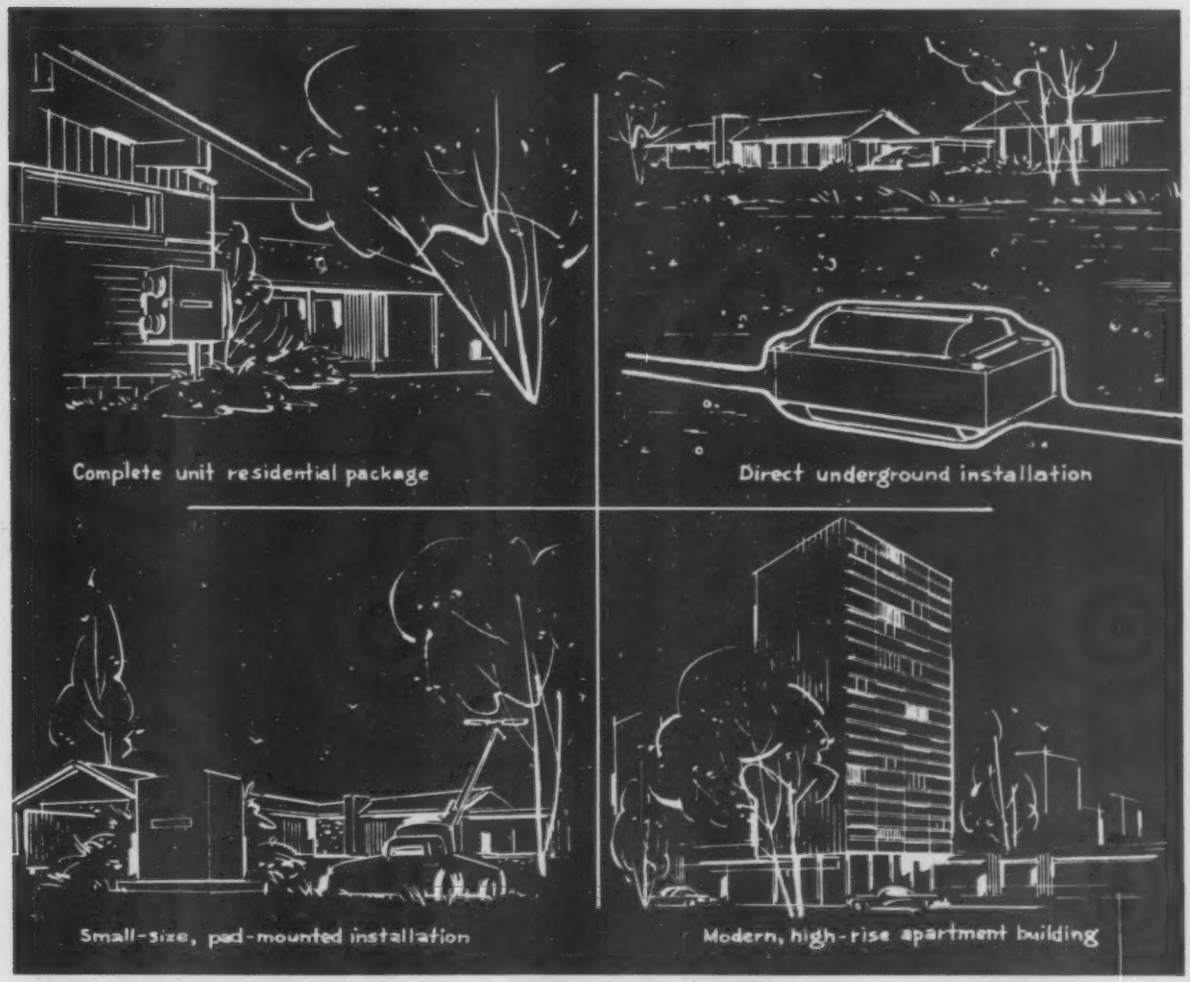
590 MEANS ST., N. W. • ATLANTA, GEORGIA

UTILITY ENGINEERING

Transmission — Distribution — Metering

Design
Installation

Testing
Maintenance



Widespread use is predicted for the new encapsulated distribution transformers—page 76

Comment on meter construction—page 79

New look at basic impulse levels—page 80

Newly designed 13.8-kv switchgear—page 84

AIEE meeting hears T&D problems—page 86

New electric utility products—page 94

Precision

How Precision's exclusive qualities make multiple lighting control **99% fail-proof**

This engineer uses a jeweler's glass for his final inspection of every Precision photocontrol. Other Precision engineers use ageing chambers, comparators, endurance and hardness testers, oscilloscopes and weatherometers — plus devices originated by Precision for "breakdown" testing of lighting controls — to insure Precision performance at sixteen separate quality control points in our labs.

It is their attention to perfection that makes Precision photocontrols so nearly fail-proof that Precision-equipped multiple lighting systems need only 1% controls replacement in any given year. That is a fact, proved on the lines of major utilities a half million times every day. This perfection results from built-in Precision distinctions that set this control apart from all complex, old-style photocontrols.

Superior materials

Precision uses the industry's largest gold electrode cadmium sulfide cell and gives it total area exposure since both shading and shielding reduce the efficiency of any photocell. Precision makes and uses the only bimetal switch metallurgically-balanced specifically for lighting control. Then Precision adds special pre-fabrication techniques possible only in the world's largest laboratory devoted entirely to multiple lighting controls: measured-atmosphere ageing, heat treating, electronic-measurement of switch calibration accuracy. No other company can invest so much skill in **every** control.

Advanced engineering

Precision gave multiple lighting its "reliability breakthrough" five years ago and continues to lead the field with the only control designed, engineered and developed for one purpose — precise regulation of artificial lighting twice each day through rigid and unfailing response to natural light levels. Other controls are adaptations from obsolete tube-type controls containing up to 18 fragile components. Precision controls have only 2 components. Precision engineering eliminates all inherent fail-out hazards of capacitors, contact balances, magnetic relays, rectifiers, sensing flexible leads, tubes and printed circuits.

Laboratory production

Precision controls are built entirely by technicians, to insure the human-eye responsiveness with all-weather durability demanded in multiple lighting control. Major utilities in every geographical region of North America have contributed field-engineering recommendations during the past four years that have made these controls virtually fail-proof on 400,000 installations. They will utilize the expanded production facilities of Precision to put thousands more of these perfected controls on the line in 1961.

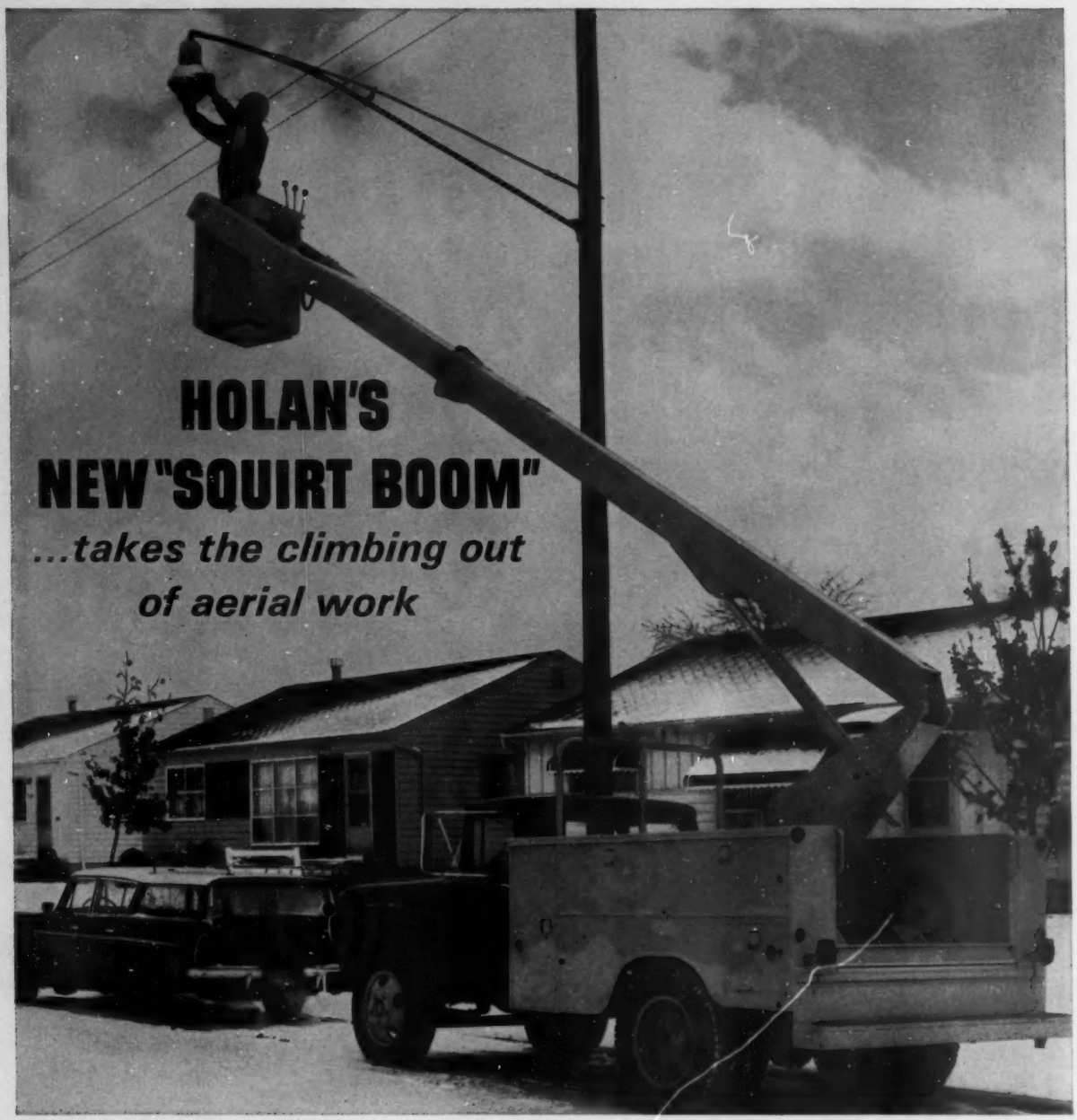
Field service engineers

Because Precision controls are used on more different installations than any other tubeless control, our field engineering representatives have unique experience in automatic control of multiple systems under all conditions. They are your ablest advisors in matching this perfected control to your most specific demands of weather, surge, lightning or light levels.

Write or wire today for data and quotations.

PRECISION MULTIPLE CONTROLS, INC. • Ridgewood, New Jersey

The difference between night and day



Here it is — Holan's new all-hydraulic Squirt Boom. Ideal for troublemen . . . the fast, safe way to re-fuse transformers. Saves money in group lamp replacement work . . . no climbing up and down a ladder and material and equipment ride in the bucket with the man. Speeds such work as installing electric service, mid-span taps, traffic signal and street light maintenance.

Now one man can do many aerial tasks because he has complete control with levers mounted on the fiberglass bucket (boom and bucket tested at 73,000 volts (A.C.) bucket-to-ground). Telescoping fiberglass boom extends 10′7″. . . raises to a 40-foot working height . . . rotates 360° in either direction. A hydraulic slave cylinder, located in fiberglass bucket yoke, keeps bucket level at all times.

Safe, dependable master-slave type controls are mounted on the bucket and on superstructure. Offset superstructure design and exclusive Holan torsion bars, attached to the body base, provide stability in all positions with a 300-pound payload . . . no outriggers needed.

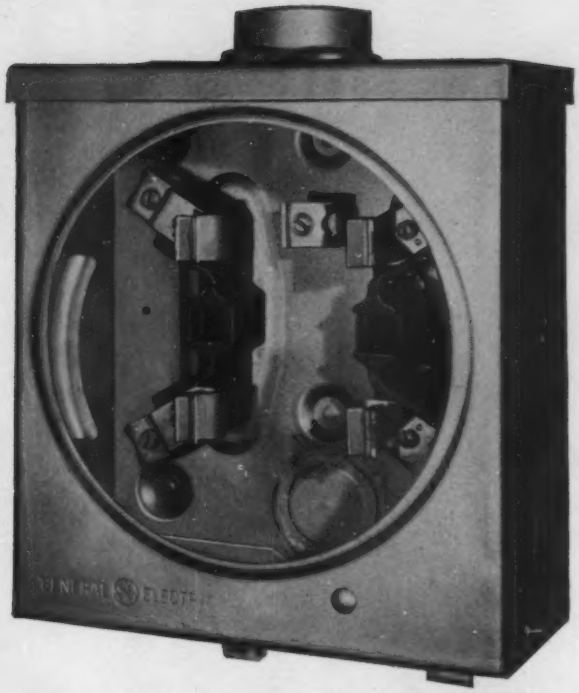
Let us send you more details on the Holan Squirt Boom . . . designed and built for safe, fast, economical aerial work. Call your Holan Field Representative, or write us.

Holan Corporation, 4100 West 150th St., Cleveland 35, Ohio

Holan

Subsidiary of THE OHIO BRASS COMPANY

HOLAN



NEW Low-Price SI-60 Ringless Sockets

General Electric announces . . . another new line of sockets, the SI-60 for 100- and 200-amp services. Meets requirements of AEIC-EEI-NEMA standards for meter sockets. *Ringless Weatherproof Construction* provides maximum protection. And, G.E.'s new SI-60 line offers exclusive features never before available in a ringless design. *New Terminal Block Assembly* with exclusive one-piece combination jaw and connector strap increases reliability . . . permits an unbroken current path from meter blades to line or load wires . . . provides excellent electrical conductivity with low heat rise. *New Plug-in 5th or 6th Terminal* simplifies shop or field conversion . . . installs in seconds, without the use of tools.

New General Electric Line of SI-60 Sockets also feature 16-gauge zinc-coated steel*. *Die-cast Hubs,* of corrosion-resistant aluminum . . . available in all popular hub sizes up to 2½-inches. *Lay-in Wire Connectors* accommodate either aluminum or copper wire. *Concentric Knockouts* are on both sides, back and bottom; for 1, 1¼, 1½-inch conduit. Your choice of *Large Case Size*—3 sizes in 100-amp, 2 sizes in 200-amp—permits fast, easy wiring.

NOW AVAILABLE in 100- and 200-amp ratings. Available soon with manual by-pass. Contact your G-E Sales Office or authorized G-E distributor for full information. Or write General Electric Co., Somersworth, N. H.

** Also available in aluminum.*

711-02

METER DEPARTMENT

GENERAL ELECTRIC

WEATHERPROOF RINGLESS CONSTRUCTION meets AEIC-EEI-NEMA standards. Case is 16-gauge zinc-coated steel with oven-baked finish. Hubs are die-cast of aluminum; staked to case for rigid, weatherproof fit.

EXCLUSIVE ONE-PIECE combination jaw and connector strap—in new terminal block—permits an unbroken current path from meter blades to line or load wires . . . provides greater reliability.

NEW PLUG-IN 5TH OR 6TH TERMINAL, another General Electric exclusive in ringless sockets, installs in seconds—without tools—greatly simplifies shop or field conversion.

Don't blindfold him!

THE MAN in this picture is a cancer research scientist. The device he is using looks like something out of science fiction—but actually, it's an electron microscope. It shows the sub-microscopic detail of a cancer cell—magnified 100,000 times. *The cost of one electron microscope is $35,000.*

Some of the equipment needed for cancer research is even more expensive.

Today, in research centers throughout the country, 1300 scientists, supported by American Cancer Society funds, are at work searching for the cause of cancer—and, ultimately, ways to prevent it.

The American Cancer Society grants millions of dollars for research on such projects as the study of viruses as a possible cause of cancer—the development of hormone treatments for cancer—the control of cancer by drugs. *Life-and-death projects.*

Your help is needed to enable the American Cancer Society to continue this support.

Don't blindfold cancer research. Give to it. Send your contribution now, to CANCER, c/o your local post office. All gifts are tax-deductible.

AMERICAN CANCER SOCIETY

CONCENTRATION

DUAL VOLTAGE SAVES $15 OR MORE ON EVERY TRANSFORMER

Concentration on one idea has resulted in the new RT&E thoroughly tested and reliable Extern-O-Switch. This redesigned dual voltage switch makes **dependable** cut-over of entire areas to higher voltage at savings of $15 or more per transformer.

Extern-O-Switch body is made of an entirely new compound — a specialized glass-reinforced Polyester thermoset material. It is highly shock resistant and actually extinguishes arcs passed over its surface. Impossible to track, its characteristics are not affected by transformer oil or heat. Electrical insulation levels are increased by 50% with this exceptional material.

The unique externally operated handle reduces changeover to a simple twist of the wrist. Key-type handle cannot be removed unless the switch is correctly positioned. Inside, high pressure contact is assured. New leaf springs behind each contact prevent metal fatigue and provide lasting, positive contact pressure.

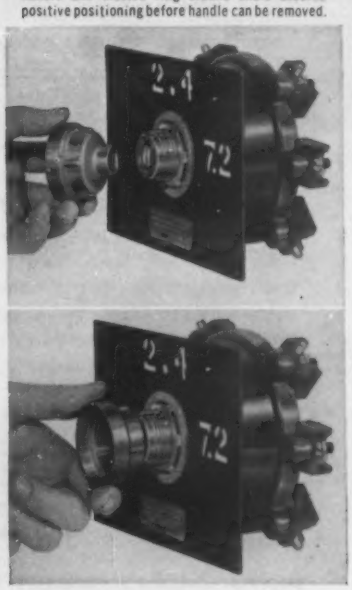
RT&E's concentrated research program developed these improvements to reduce man hours and save money. Protect your investment, look to RT&E — originator of the dual voltage transformer and externally operated switch.

Engineering Talent Concentrated On One Idea — **A BETTER TRANSFORMER**

RT&E CORPORATION

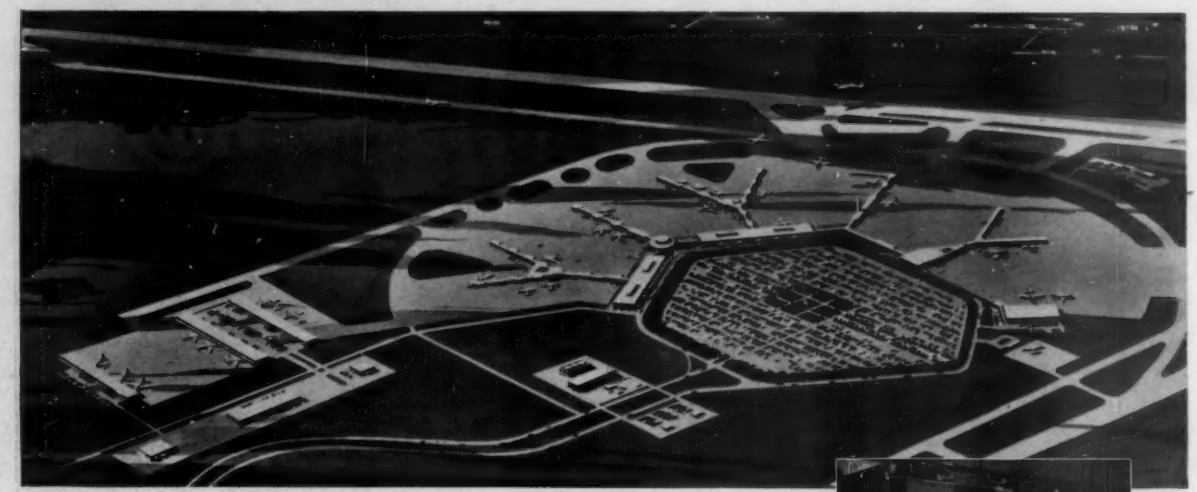
WAUKESHA, WISCONSIN • PORTLAND, OREGON • ARLINGTON, TEXAS

SAFE! Unique keying action between handle and slotted ring around shaft assures positive positioning before handle can be removed.



TT

Continuity and Dependability of Electric Power Supply is assured at O'Hare, Chicago's Jet Airport



George Lenahan, chief electrician at O'Hare, checks G&W automatic transfer switches, above, on feed to control tower and runway lights, below, on main feed to airport terminal building. Above is artist's concept of how Chicago's jet airport will look in the future.

G&W Switches play a significant role in the 'round-the-clock operations of Chicago's multi-million-dollar O'Hare International Airport. Radio, radar, runway lights, and dozens of electronic devices must never fail or be affected by power interruptions if safety and operational efficiency are to be maintained.

All electrical feeds to these critical areas are in duplicate to assure continuity of power. Vital functions such as control tower equipment and runway lights are switched automatically from any feeder, even temporarily in trouble, to the spare feeder with hardly a blink in the lights.

G&W Automatic Transfer Switches on main incoming service and service to control tower runway lights keep communications and lighting facilities operating to maintain the needed power to guard lives, effect safety, and sustain ten-mile-per-minute jet operations. G&W Manual Switches provide flexibility on other parts of the system.

These same measures of switching dependability are inherent to every G&W Switch — records of accomplishment that can be applied to the most rigorous of power requirements. Your G&W Representative is exceptionally well qualified to counsel on every switching need whether standard or specialized in nature. He is at your service without obligation.

G&W ELECTRIC SPECIALTY COMPANY
3524 WEST 127TH STREET • BLUE ISLAND, ILLINOIS
Canadian Mfr. • Powerlite Devices, Ltd. • Toronto, Montreal & Vancouver

superior quality standards — inspired specialized design

D61-1

Wanted: Manuscripts for publication

The editors of Electrical South will welcome contributions from the field for publication. Electrical contractors, consulting electrical engineers, light and power company engineers, and others closely associated with the electrical industry are invited to submit articles, photographs, and drawings relating to important and interesting electrical projects in the South and Southwest.

Articles are wanted in two principal classifications:

Wiring and Lighting: Articles on interesting and unusual electrical installations; any phase of electrical contracting such as business promotion, estimating, handling men and materials, etc.

Utility Engineering: Articles relating to any phase of transmission, distribution, and metering, including design, installation, testing, and maintenance. These articles should be "by-line" articles carrying the name of a Southern or Southwestern light and power company.

All articles will be given careful consideration and payment will be made promptly for all material accepted for publication.

Address all communications to the editor:

Electrical South
806 Peachtree,
Atlanta 8, Ga.

The LA-45 is a good example of Southern States quality

Close examination of the design and construction of this 45° elbow connector will reveal many of the qualities common to Southern States fittings: silicon bronze hex-head bolts, recessed for one-wrench installation; rough-ground contact surfaces; extra ruggedness without excess bulkiness; good design.

Southern States also offers a full line of weldments.

SS SOUTHERN STATES
EQUIPMENT CORP.
HAMPTON, GEORGIA

IN CANADA Dominion Cutout Co., Ltd., Toronto

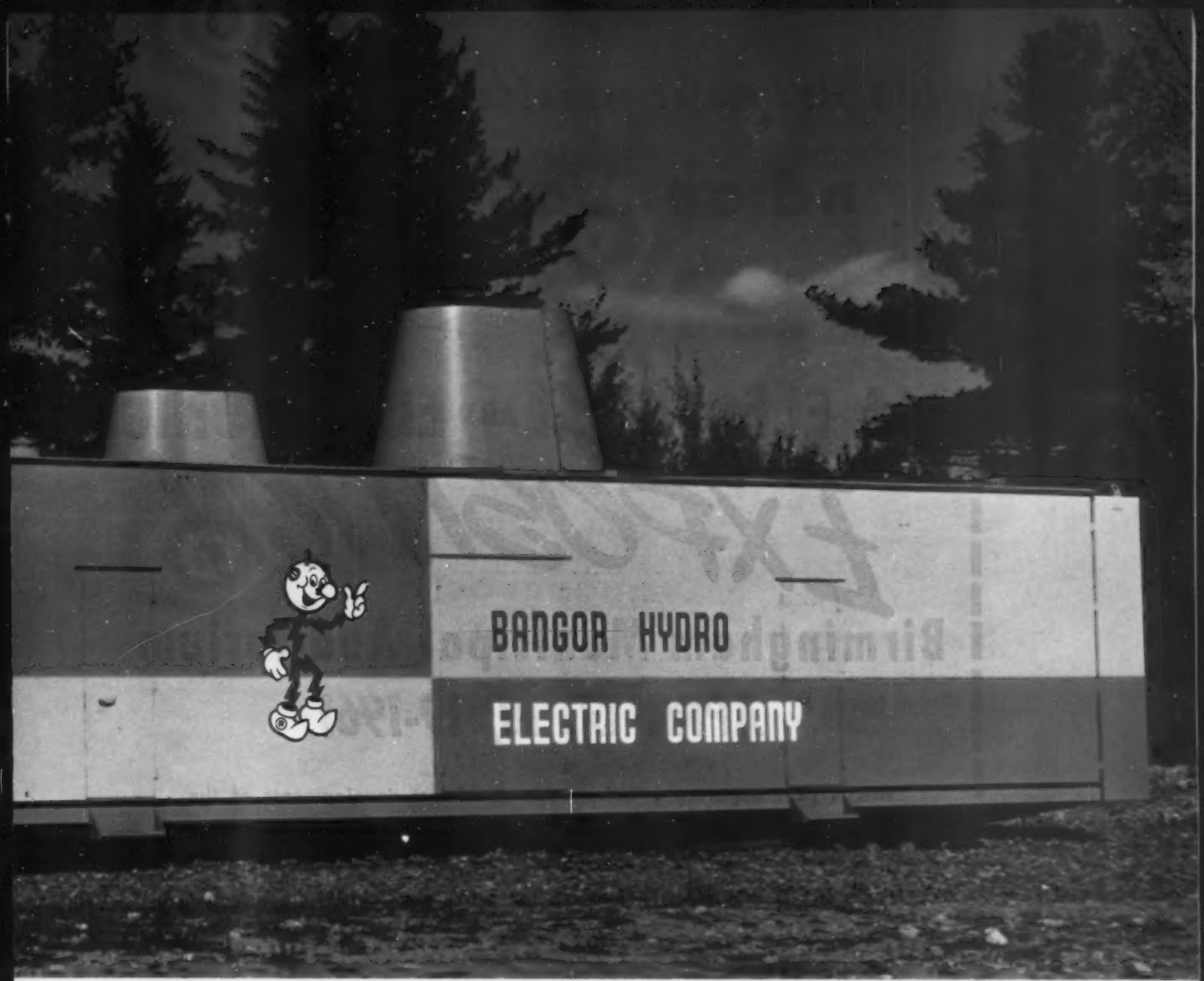
Bangor Hydro-Electric Co. *Again* picks Electro-

In the summer of 1958, Bangor Hydro-Electric Company completed an economic analysis of future generation requirements on its system serving four counties in eastern Maine. With load growth averaging approximately 8,000 KW per year, Bangor Hydro-Electric studied three alternate methods to provide increased capacity for a six year period beginning in 1960:

1. Addition of preferred standard steam plants of 22 MW in 1961 and of 33 MW in 1965 or 1966.
2. Addition of a peak-shaving steam plant in 1961 and a preferred standard steam plant in 1963.
3. Addition of Diesel "end-of-the-line" peaking units in 1960, with similar installations in 1961 and 1962, combined with a preferred standard steam unit in 1964 or 1965.

Conclusions drawn from this study showed large savings could be realized with peak-shaving equipment. The Diesel Plan #3 showed the greatest savings by a considerable margin, varying from $100,000 to $790,000 per year.

ELECTRO-MOTIVE DIESEL PLANT—The initial Diesel peaking unit has been installed at Medway, Me., to provide "end-of-the-line" area protection and peaking service. The 8,000 KW Plant is remotely controlled from the hydro station. To provide area protection, the Plant starts, synchronizes and goes on line, in less than two minutes. Bangor Hydro-Electric picked the Electro-Motive Peaking Plant to produce adequate capacity for its system at lowest possibie costs, while improving service reliability in remote areas.



Motive Peaking Power for maximum savings

SECOND ELECTRO-MOTIVE DIESEL PLANT—*The success of the first Electro-Motive Plant at Medway led to the order of a second 8,000 KW plant to be installed in the southern area of the system. Due to be operating by the Fall of 1961, the new plant will also provide additional peaking capacity along with protection for another "end-of-the-line" area.*

FLEXIBLE AND RELIABLE—The inherent design characteristics of the Electro-Motive Equipment at Bangor Hydro-Electric that make it ideal for peaking and area protection, also make these Plants ideal for many of your system requirements. With Electro-Motive Equipment, you get fast start for spinning reserve, automatic dead load pick-up for area protection, remote control for peaking service, portability for simple installation, and freedom from damage to components caused by rapid thermal changes occurring from start to full load.

Electro-Motive Peaking Plants, available in sizes ranging from 2,000 KW to 10,000 KW, permit the most economical and efficient peaking operation, and provide for expansion at the lowest possible cost. Ask your Electro-Motive representative for complete details. 61-U-9

ELECTRO-MOTIVE DIVISION · GENERAL MOTORS

LA GRANGE, ILLINOIS

In Canada: General Motors Diesel Limited, London, Ontario

Join the 100 plus major manufacturers at the . . . . .

2nd annual

ALABAMA ELECTRICAL AND ELECTRONICS EXPOSITION

Birmingham Municipal Auditorium

APRIL 17, 18, 19-1961

This is your opportunity to examine the latest developments of the Electrical and Electronics Industries. Whether you are a designer, a consumer or a distributor of Electrical and Electronic Devices, you will find this show extremely interesting — you will not want to miss it.

THE VERY NEWEST DISCOVERIES AND IMPROVEMENTS IN THE

ELECTRICAL AND ELECTRONIC FIELD

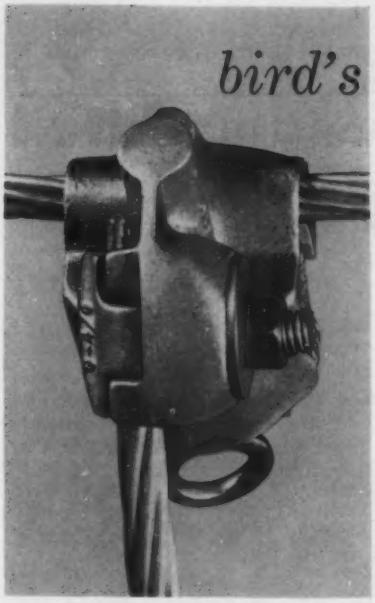
will be on display for your benefit

We Invite - -

ARCHITECTS - ENGINEERS - ELECTRICAL DISTRIBUTORS - UTILITY EXECUTIVES - INDUSTRIALS - ELECTRICAL CONTRACTORS - GOVERNMENTAL AGENCIES - - -

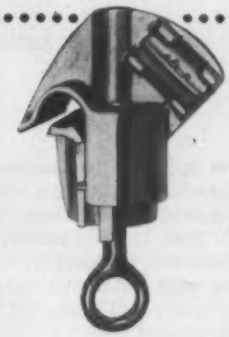
- - Stay abreast of the ever-expanding electrical field - - -

President
BILL MURPHY
Vice-President
JIM McLAY
Treasurer
JIM HEUSSER
Secretary
JIM McLAY
Advertising
LARRY DAY
NELSON BRYANT
Entertainment
C. E. PARKER
BRYN WATERS
Promotion
GENE KILLIAN
KYLE COOPER
M. R. HAZZARD
BEN SIBLEY
GENE CALLAHAN



bird's eye view of a cool running hot tap for ACSR...

with a 9051 aluminum clamp



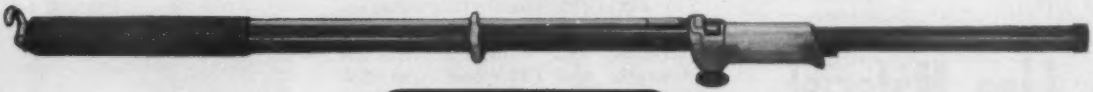
The 9051 is WIDE . . . 2⅛" . . . conductor grooves are deep, wedge type for greater contact surface and pressure. Stainless steel Bellevilles on both line and tap compensate for "conductor relaxation".

installed with

BODENDIECK

Medallion fiberglas shotgun

The world's finest shotgun stick thoroughly field proven through years of use. Light, strong and smooth working.



BODENDIECK TOOL CO., TAYLORVILLE, ILLINOIS

Are You Making Use of Our Reader Service?

The editorial and business staff of ELECTRICAL SOUTH is eager to serve you. One way in which we can help you is to make it easy for you to draw upon the wealth of technical and promotional material available from manufacturers.

In the accompanying pages are the descriptions of scores of useful catalogs, application information booklets, and technical publications. These are available without charge.

Check over the list of publications available, indicate the numbers of the ones you want on the postage - paid card to be found on page 17, and mail it to us with your name, title, company and address plainly written. We will tell each manufacturer to send directly to you the information you want.

Four revolutionary new encapsulated

Several manufacturers release details on this distribution development

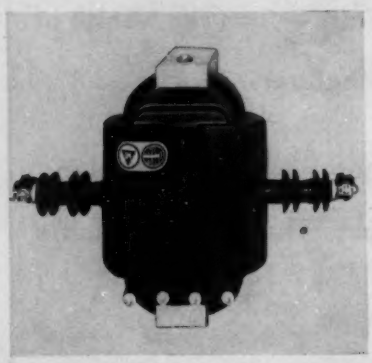
◆ A radically new development —the encapsulated distribution transformer—has been introduced by four manufacturers, all of whom are backing up their products with extensive data on benefits and predictions for ultimately widespread use.

The four manufacturers involved in the separate but almost simultaneous announcements are General Electric Co., Line Material Industries, Moloney Electric Co., and Pennsylvania Transformer Div.

Line Material

Line Material Industries' transformers have undergone a six-year development and testing program and will be offered to selected utilities for further evaluation under actual operating conditions.

Present units are rated 15 kva, 2.4 through 7.62 kv. Additional ratings will be available shortly.



Line Material Industries will soon offer its encapsulated distribution transformers to selected utilities for further analysis and evaluation.

Employing modern techniques and materials, these encapsulated transformers offer many benefits to utilities: they eliminate the tank which can corrode, oil which can deteriorate, the gaskets which can absorb moisture. Thus, they require a minimum of maintenance.

In addition, these units utilize less pole space per mounting as they are light in weight and small in size.

L-M's proven "Round Wound" core and coil assembly is encapsulated in an epoxy compound especially developed for this application. The epoxy material has (1) excellent weathering characteristics including resistance to sunlight, (2) high dielectric strength, and (3) good heat dissipating qualities.

Thermal properties of the encapsulated units are comparable to present standards for oil-immersed transformers.

Moloney

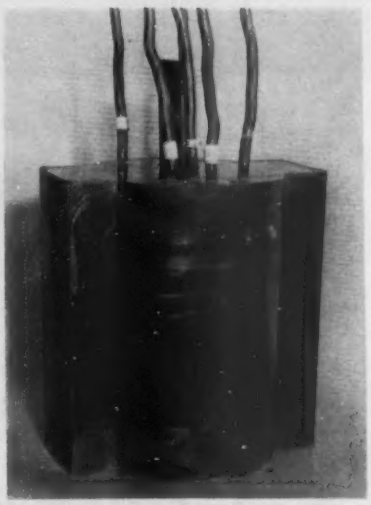
Encapsulated distribution transformers have also been developed by Moloney Electric Co., in cooperation with several utilities.

Use of these disposable encapsulated transformers eliminates transformer oil, tank, accessories, maintenance, and repair. Additionally, the appearance of residential distribution systems is greatly improved.

Moloney Electric began working with encapsulated materials and processing methods in 1953, when they encapsulated coils for electronic applications. In 1957, the information gained from this early experience in encapsulation was applied to distribution transformers as a Moloney research and development project.

In 1959, Moloney encapsulated distribution transformer core-and-coil units and these units were installed underground. These transformers are connected for a continuous bucking heat run and have now completed more than a year of operation.

During this time, Moloney research and development personnel have periodically measured both the temperature of the units under test and the temperature of the surrounding filter.



Performance of units under test has given Moloney Electric Company confidence that encapsulated distribution transformers can be successfully used in residential systems.

The experience gained from encapsulating electronic units and the subsequent research and development on encapsulating distribution transformers have resulted in the development of new encapsulating processes, materials, fillers, and insulation structures.

These new materials and processing methods, and the performance of the units under test, give Moloney confidence that encapsulated distribution transformers can be successfully applied to residential distribution systems.

Moloney Electric Company has joined with several utility companies located in various parts of this country in encapsulation transformer studies and experimental programs. These experi-

distribution transformers introduced

which is to undergo still further study under actual operating conditions

mental programs are directed toward finding the answers pertaining to installation costs, methods of application, and proper designs for the various types of systems.

At the present time, there are five basic methods of installation being investigated. These methods are: an encapsulated transformer to serve each residence—(1) wall mounted, and (2) direct burial; and encapsulated transformers to serve four to six residences—(3) mounted in an enclosure, (4) pole top mounting, and (5) vault installation.

Plans have already been completed for some of the experimental applications. The first wall-mounted encapsulated distribution transformer is now being manufactured and is scheduled for installation early this year on the system of an Eastern utility.

Although these units are not yet ready for commercial application, it appears that adaptation of encapsulated distribution transformers holds great promise for the reduction of utility operating costs and improvement in the appearance of utility distribution systems.

Pennsylvania

Distribution transformers without tanks were recently announced by Pennsylvania Transformer Division of McGraw-Edison Co.

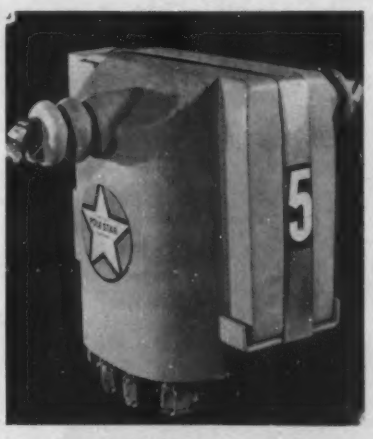
The company revealed that for several years it has been experimenting with such transformers—specifically, with oil-less, encapsulated transformers in distribution ratings.

Results of the research and development program indicate that transformers of this type eventually will replace tank-contained, oil-filled transformers on both overhead (pole) and underground systems. Greatly reduced weight and size, with consequent savings in installation time and cost, are among the advantages that would result.

The tremendous increase in power consumption during the past decade is cited as a major reason for the development of encapsulated transformers. Because more transformers are needed, the company explained, and many of these, by necessity, must be placed in proximity to homes and commercial establishments, both the cost and size of transformers are growing in importance.

When proven commercially, encapsulated transformers will satisfy the requirements for economy and unobtrusiveness. In both pole and underground applications, the expected savings in weight and space will facilitate installation.

Recent Pennsylvania Transformer prototype units consist of a core-an-coil assembly encapsulated in modified epoxy. Encapsulation is accomplished by a vacuum-pressure method. There is no tank, and even the bushings are cast in place.



The size of this Pennsylvania encapsulated distribution transformer is indicated by the kva identification, which is 2½ inches in height.

Tests conducted to date by Pennsylvania Transformer include impulse, heat cycling, and weather exposure. Operational data obtained over a two-year period is now being studied in preparation for initial production models.

General Electric

General Electric's Distribution Transformer Department, Pittsfield, Mass., has also announced an encapsulated distribution transformer, using a special epoxy resin developed by the company.

According to W. R. Smart, department marketing manager, the new encapsulated distribution transformer is the most significant advance in transformer design in the past three-quarters of a century.

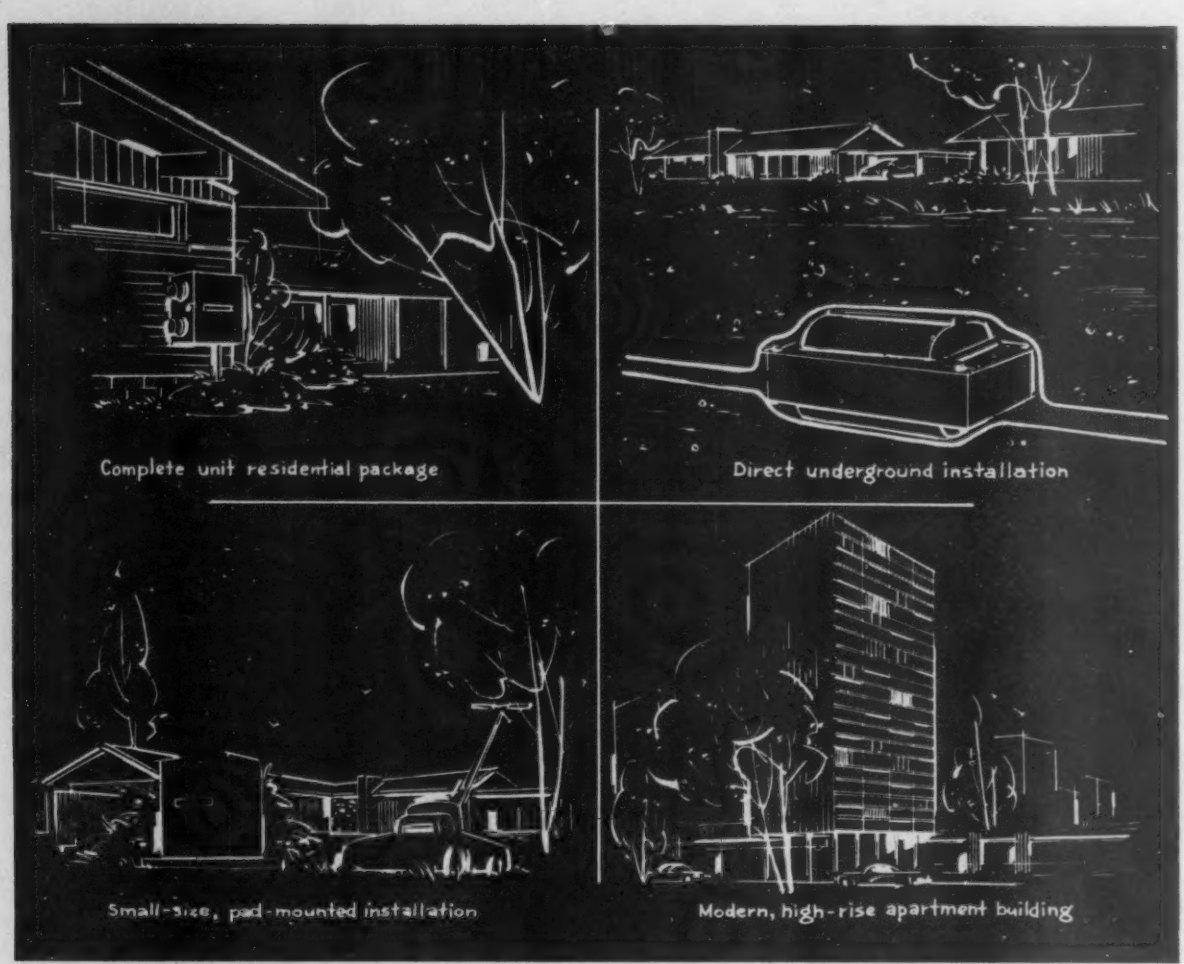
With the elimination of all paper insulation and nearly all oil from the core and coil, the new unit has a dielectric strength equal that of conventional oil-type transformers. Less than one per cent of the oil used in oil-type transformers is contained in the new encapsulated units.

Incorporating a newly-developed, high-thermal capacity insulation, the new units will be rated at 80 C average winding temperature rise.

The encapsulated unit is the first distribution transformer designed in 75 years which does not use oil in significant quantity for cooling and insulating. In 1886, Elihu Thomson applied for the first patent for an oil-filled transformer.

Weighing 25 per cent less than conventional oil-type transformers, the new encapsulated unit is also 25 per cent smaller and requires 40 to 50 per cent less volume.

During the next five years, department officials believe future potential applications will include direct burying of the unit, industrial applications in mines where



This shows how GE envisions its new encapsulated distribution transformer to be used in future potential applications.

Three G-E personnel discuss the transformer: from left, F. S. Nichols, solid insulation chemist; W. A. McMorris, manager of advanced product engineering; and B. V. Giegerich, advance development engineer.

moisture and other similar problems are constant threats, and replacements for pole-top use.

Unit residential package

An early application will be in a unit residential package housing the transformer and other accessories, including load break disconnect switches and meters which will give the consumer complete control in restoring electric power.

With an appearance design which makes it suitable for mounting on the outside wall of a house or garage, the package will be connected via a service entrance panel containing a low-voltage circuit breaker whose trip characteristics are coordinated with the load capabilities of the transformer to provide full overload protection for the transformer.

Primary leads run through a metal pipe from underground to prevent any disturbance to leads. Ventilated openings in the com-

(Continued on page 129)

Comment on meter construction

A utility's difficulty in calibrating meters to the desired accuracy brought attention to the type of disk cleaner that was being used

By Nick Newton, Arkansas Power & Light Co.

◆ Recently, I commented on modern watthour meter potential coils, and how construction methods and materials are superior to those used in older meters.

I also brought out, by citing an instance in which a 120-volt meter had operated nicely in a 240-volt socket, how these superior features can sometimes get a meterman in a bad situation and cause his firm considerable embarrassment.

Bearing in mind that human error and lack of foresight on our part are definitely involved and must be considered, there are other facets of modern meter construction that can put a meterman in an awkward and uncomfortable position.

High-density magnets

There is, for instance, the matter of modern high-density damping magnets. These little devices, built into our present-day meters to produce the braking effect on the meter disk, have in recent years become stronger and stronger, while being made smaller and smaller.

One of our meter testers recently called me into the meter test shop. One of a new batch of meters, single phase, 240-volt, three-wire, was connected and running on the test board. And, according to his figures, which were checked and found correct, the meter was running 4.7 per cent fast. He also informed me that the full load adjustment on the meter had been moved as far as it would go toward "slow."

In other words, we had a new meter, fresh from the factory, which was almost five per cent fast. And this was the best calibration possible.

Assuming some sort of slip-up on the assembly line at the factory, I instructed the meter tester to put the meter aside and to wait for further instructions. He quickly informed me, however, that there were seven more, or a total of eight out of a batch of 60 meters, that he was unable to calibrate closer than 2½ per cent of 100 per cent accuracy.

It was almost quitting time and I needed to go out of town early the next morning, so I left instructions that none of these meters be allowed out of the shop until I could look further into the matter.

Disk cleaner used

The next day, and 200 miles away, I received a telephone call. I was told by one of the men in our test shop that the meters that were defective were those received with "whiskers" between the rotating disk and the permanent magnet, and requiring "raking out" with a disk cleaner.

Some of you may have encountered this phenomenon, and know already what we finally discovered.

We still have some of the old type bronze disk cleaners with a tiny insert of iron in the cleaning end, and the men in the shop had been using one of them to clean the "whiskers" from these tiny alnico magnets in the new meters. This was a mistake!

Copper, copper alloy, aluminum, or any other non-magnetic material is all right. Scotch tape having adhesive on both sides is excellent. So are the so-called magnetic air-gap brushes which are on the market. But don't put iron on these new high density magnets!

Suspicions correct

Tests made in the meter shop where I received the telephone call proved our suspicions about the disk cleaners to be correct. We made checks on several different makes of meters, and found that all of them are affected when iron in any form is brushed against the magnet. Some were affected more than others, but all were vulnerable to iron. The inaccuracies, after "cleaning" the magnets with the iron-containing tools, ranged from 2½ to eight per cent. And using a piece of hack-saw blade created results that were even more astounding.

On one meter, instead of decreasing the braking effect of the magnet and speeding up the rotation of the meter disk (as was the case in nearly all meters checked), the braking force was apparently increased and the disk rotation speed was decreased.

This was due, I was later informed by a factory representative, to the "shifting" of the point of greatest magnetic force or influence, on the disk, to a point farther out toward the periphery of the disk.

Thus we found that even the direction of the stroke of the cleaning tool on the magnet had a definite effect on the accuracy of the meter, either slow or fast.

Slow in finding out

As is all too often the case, we found that we didn't discover anything new in these findings. We were just slow in finding it out. I am told that the manufacturers have known of these magnetic characteristics and resulting reactions for some time, and have issued instructions that warned against the use of cleaners with iron inserts or any other magnetic material.

In any event, we have discarded all our old cleaners with the iron inserts in the cleaning end, and now use "home-made" jobs consisting of thin strips of copper or some other non-magnetic material, such as bronze, inserted into a suitable handle. The cleaning qualities of these tools can be increased significantly by the use of a strip of scotch tape, sticky on both sides, applied to one side of the tool.

(Continued on page 129)

New look at basic impulse levels

In this second of two articles, reviewing design of substations with respect to BIL, the author anticipates further reductions

By H. H. Strozier, Assistant Chief Planning Engineer, Georgia Power Co., Atlanta, Ga.

◆ The insulation level for a substation can be more easily selected than for a transmission line[1].

Transformer BIL can be selected in accordance with Table I (see Part I) or at some reduced value in accordance with protective ability of the lightning arrester. Having decided upon the transformer BIL, there is hardly any need for going to a materially higher value for buses and switches.

Substation design practices in the past, in general, overinsulated buses and switches, partly due to an attempt to prevent bus flashovers and attempts to operate air break switches without striking phase to phase, or phase to ground. Also, additional insulation on buses and switches did not cost much, in comparison to the same additional insulation in the transformer.

An air break switch today is accepted to be merely a no-load disconnecting device, having no interrupting ability. Its open gap spacing and phase-to-phase spacing need be no greater than the spacing between equipment bushings (transformers and circuit breakers).

There is little reason to make the transformer the weak link in the insulation chain; therefore, bus insulation should be coordinated with transformer insulation.

Bus spacing varies

Substations are in existence with 115-kv bus spacing as large as 14 feet and as low as five feet. Twelve-strain insulators (5¾ by 10) are used on some, while six or seven are used on others. In many cases this involved merely a little more material and a little more space.

The increased material cost may be nominal; however, cost for additional space can be large. In a large substation having several lines and associated circuit breakers consideration should be given as to the location of protective equipment and the effect of voltages at remote points higher than the arrester spark-over voltage.

Two interesting observations in regard to bus spacing and switch insulation are as follows: one case where a 110-kv bus operated successfully for several years with 30-inch phase-to-phase spacing; another where all disconnect switches in a 110-kv substation were insulated for 69 kv and operated successfully for 24 years. These switches now have been reinsulated for the 115-kv standard.

These two cases might be considered as extreme; however, this and other similar experiences indicate possible bus insulation reductions.

Greater savings possible

Since the transformer is the most expensive piece of equipment in the substation, greater total saving can result in reduced transformer BIL than for other equipment. Substantial savings in transformer costs and improve-

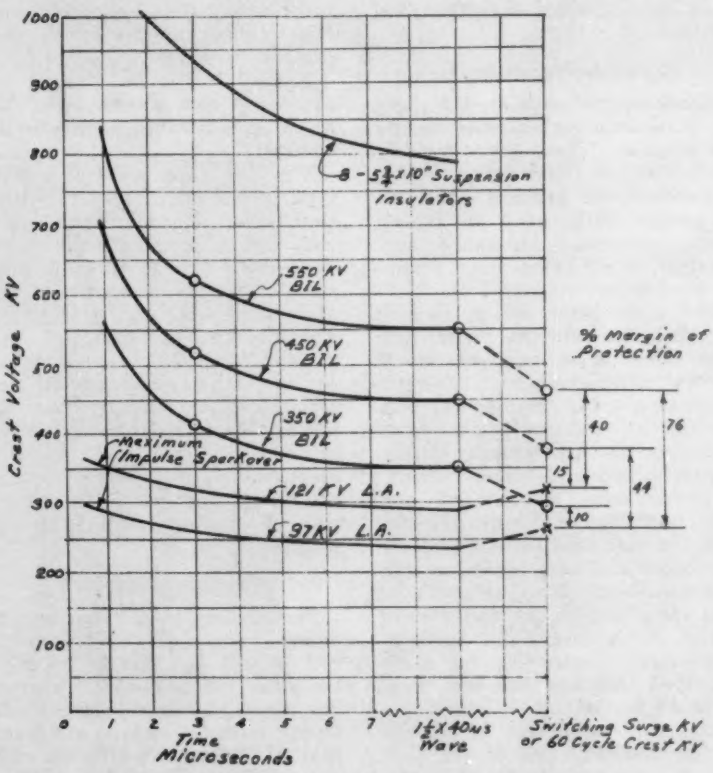


Fig. 5—Coordination and protection for a 115-kv system.

1For list of references see end of article on page 128.

ments in transformer characteristics have been gained by using transformers with reduced BIL.

This has been brought about by increased knowledge of insulation strength of transformers, especially in the switching surge range, and major advances in the protective characteristics of lightning arresters.

It is reasonable to assume that any transformer BIL which can be protected with lightning arresters suitable for system conditions will be satisfactory. Two separate surge voltage requirements are considered: (1) impulse, (2) switching surge. The impulse strength of transformer insulation is well established by accepted tests.

In coordinating impulse strength of transformer insulation with protective characteristics of a station-type lightning arrester, one method uses the maximum lightning arrester IR at 10,000 amperes plus 20 per cent margin as the BIL required. Another uses the arrester IR at 5,000 amperes plus 15 per cent margin plus a fixed kv value for lead IR drop as the required BIL. In either case with modern arresters the impulse protection ceases to be a problem.

Switching surges present more of a problem: one, because of the varied nature of switching surges; another, because no adequate test has been devised to test the switching surge strength of transformer insulation. Presently the switching surge strength of transformer insulation is accepted to be 83 per cent of the BIL.

The switching surge sparkover for a station-type lightning arrester is approximately two times rated crest voltage. A margin of 15 per cent is considered necessary between the switching surge strength and the switching surge or low frequency sparkover voltage of the arrester for adequate switching surge protection.

Comparison made

Figures 5 and 6 show the coordination of insulation strength of a transformer as compared with the sparkover value of a modern station-type arrester. It can be seen that impulse protection is no longer a problem.

If we assume that a minimum margin of 15 per cent is needed between switching surge strength and maximum low frequency sparkover, then on grounded neutral systems it is permissible to operate transformers with BIL's reduced one step on a 115-kv system, and two steps on 138-, 161-, and 230-kv systems.

Figure 5 shows a ten per cent margin between the switching surge strength of a 350-kv (two steps reduced) transformer and the maximum sparkover of a 97-kv arrester.

In 1959 five major manufacturers supplied transformers in the 115-kv, 138-kv, and 230-kv classes, as shown in Table III. The trend is definitely toward reduced BIL's. Also, the present standards are of limited value except as a reference. For example, 1,050 BIL is the 230-kv standard; statistics show practically no transformers for a 230-kv system being built with 1,050 BIL.

The table shows 0 percent—1,050; 20 per cent—900; 58 per cent—825; and 22 per cent—750. If the majority is followed, the standard would be 825 kv. However, the point in question is, what can be protected? Also, why should the BIL reduction be in steps, why not use per cent reduction and specify the level which can be protected for a given system?

In the 230-kv class of equipment, 1½ steps' reduction is popular; on a 115-kv system, 350 kv is too low for an 80 per cent (97-kv) lightning arrester; however 400 BIL (1½ steps) could be protected with a 97-kv arrester.

Where weight and space are a premium, 350 BIL has been used on 115-kv mobile transformers. In this application a lower voltage arrester can be used, entailing some risk to the arrester but none to the transformer. One manufacturer reports eight 115-kv mobile transformers on order, or recently shipped, with 350-kv BIL insulation.

Arrester determines BIL

As can be seen from Figures 5 and 6, the actual safe transformer BIL is determined by the lightning arrester rating. If system characteristics demand a full voltage arrester, then one-step reduction in the 115-kv class is a borderline case.

However, most systems today employ some means of neutral grounding. The grounding methods are becoming more reliable and effective, so that the ratios X_0/X_1 and R_0/X_1 have been reduced to the point where modern lightning arresters of 75 per cent and 80 per cent of full voltage can be used.

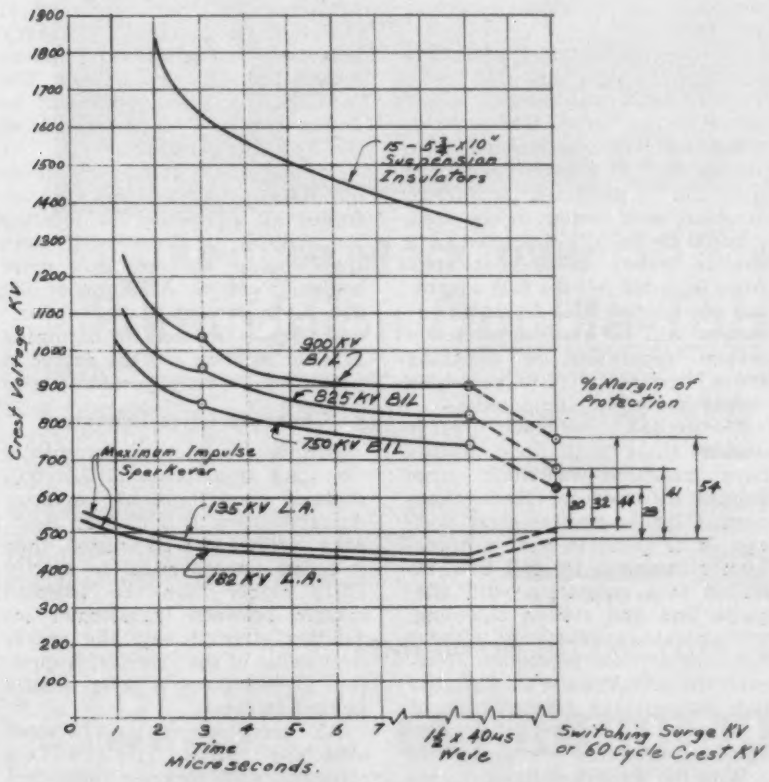


Fig. 6—Coordination and protection for a 230-kv system.

Table III — Percentage comparison of full insulation to reduced insulation*

	Company A %	Company B %	Company C %	Company D %	Company E %	Total mva**	Average %***
			115 kv class				
Full 550 kv	25	55	52.6	85	20	5,900	51.6
1 - step 450 kv	75	45	47.0	15	80	5,500	49.2
2 - step 350 kv	0	0	0.4	0	0	28	0.2
			138 kv class				
Full 650 kv	10	—	19	75	30	4,200	23.8
1 - step 550 kv	70	—	76	25	70	12,300	69.4
2 - step 450 kv	20	—	5	0	0	1,200	6.8
			230 kv class				
Full 1,050 kv	0	0	1.3	60	0	130	0.6
1 - step 900 kv	10	30	20.0	20	0	4,200	19.4
1½ step 825 kv	60	49	65.7	20	90	12,000	58.0
2 - step 750 kv	30	21	13.0	0	10	4,560	22.0

*For five transformer manufacturers, from 1957 through 1960.
**Total mva reported, actual mva in excess of these figures.
***Average % of total mva.

AIEE transaction paper 60-80, "Dielectric Test on Transformers as Influenced by Further BIL Reduction," discusses possible ultimate BIL reductions. This paper points out that ultimate reduction will be limited by low-frequency test requirements, which appears for systems of 230 kv and above to be four steps down.

An example is made of a 230-kv transformer with four steps' reduction (550 kv). Using a 75 per cent arrester (182 kv), the transformer could be provided adequate impulse protection but not adequate switching surge protection. As arresters are improved, this full four steps' reduction should be possible.

Reduction of bushing insulation has not received as much interest as winding insulation; in this area there is further need for accurate switching surge data. Experience indicates that with 75 and 80 per cent lightning arresters one-step reduction in bushing insulation is satisfactory.

Reluctance to lower BIL's

There has been some reluctance to reduce transformer BIL's in areas of frequent lightning storms. Since a modern station-type lightning arrester offers a greater margin of protection against lightning than against switching surges, the number of lightning storm days should have little bearing on the question.

There is a case of a 350-kv BIL transformer in use on a 115-kv system in the Northwest where the annual isokeraunic level is five; engineers in the Southeast have expressed opinions that this transformer would be unsatisfactory in the Southeast.

Station-type arrester protective characteristics are such that transformer BIL's are mainly determined today by switching surge requirements. It is reasonable to assume that if a given insulation level can be protected by modern arresters on a system in one area, it could be equally protected on a similar system in another area. Also, in order to take full advantage of reduced BIL, lightning arresters will be necessary on any system regardless of lightning storm frequency, since switching surges cannot be eliminated.

Theoretical switching surge studies along with field studies have measured switching surge voltage as much as three times normal line-to-neutral crest voltage. It is possible that a transformer insulated for full BIL, installed in a substation with adequate line and station shielding, will operate satisfactorily without lightning arrester protection. However, the economics of the installation warrant the investigation of a reduced BIL transformer with lightning arresters.

With the subject of lightning arrester protection also is the subject of lightning arrester location. It is recognized that for the transformer the best location is on the transformer as close to the bushing as possible.

This does not afford the same protection to other equipment in the substation (circuit breakers, potential transformers, current transformers, switches, etc.). The safe BIL for these items will be determined by their distance from the lightning arresters.

In multibank substations more optimum protection can be afforded all equipment by locating the arrester, or arresters if more than one set is used, in a more central location. AIEE paper 60-250, "Arresters on H-V Stations," describes a method of lightning arrester location and the degree of protection to be expected.

Characteristics important

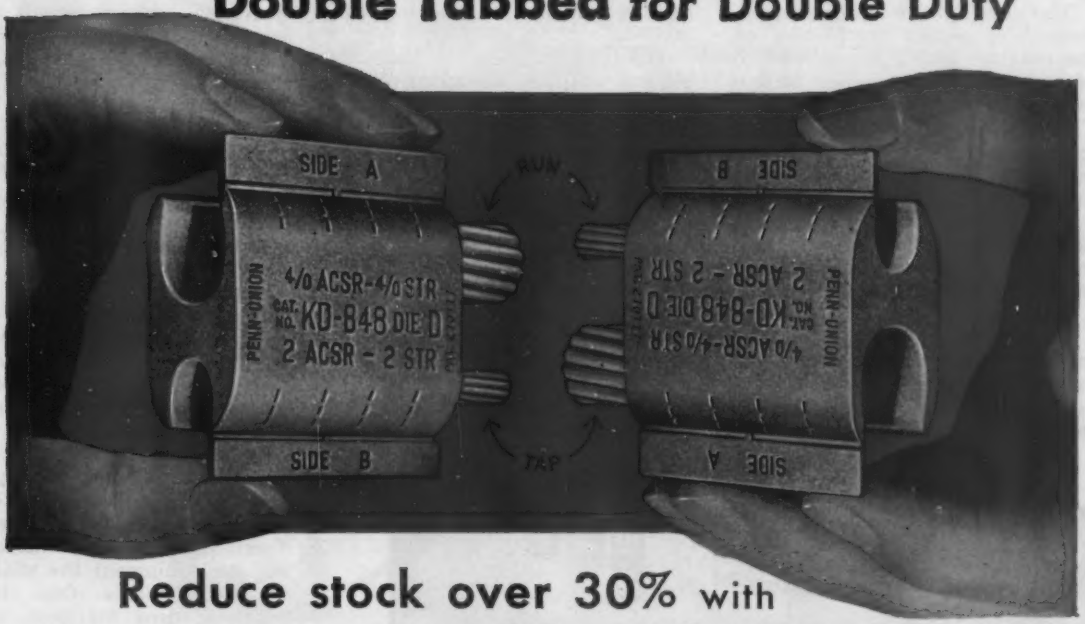
Ultimate reduction in substation and transformer BIL's will depend upon lightning arrester characteristics. If a modern lightning arrester can be trusted, then it seems uneconomical to specify BIL's higher than the accepted margin between transformer insulation strength and the sparkover value of the arrester. A question at this point is, what should be that margin?

An accepted margin between switching surge insulation strength and arrester low fre-

(Continued on page 128)

REVERSIBLE

Double Tabbed for Double Duty



Reduce stock over 30% with

Penn-Union *Double-Tab* "Press-On"

Less Stock— Reversible for dual application.

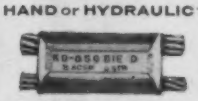
High Conductivity— E. C. Aluminum extrusions assure cool running high efficiency contacts.

Easy Crimping— Fully annealed for easy installation— deep indent crimp lines.

Pre-Loaded Inhibitor— Cleaned contact surfaces kept free of oxide re-formation by non-dripping Penn-Union "Cual-Aid." In colored polyethylene bag printed with complete information.

Crimp with tools you have

HAND or HYDRAULIC



using O and D dies

Cu to Al— Heavy spacer provides conductor separation and prevents strand cutting. Also minimizes galvanic corrosion.

Weather-Protected—Full-length tab provides complete enclosure for inhibitor.

Cable Protection— Heavy chamfering of cable openings protects main and run.

The Complete Line— Double Tab cable sizes #6 through 4/0. Single Tab cable sizes to 400 MCM.

PENN-UNION ELECTRIC CORP., Erie, Pa.

Export Sales—Philips Export Co., 100 East 42nd St. New York 17, N.Y.

Sold by Leading Electrical Distributors

PENN-UNION
a good connection

Catalog Sheets or Samples on Request

Newly designed 13.8-kv switchgear

Equipment was developed for advantages of stored-energy closing

◆ A completely new design of 13.8-kv circuit breakers and switchgear — first equipment in this voltage rating developed by I-T-E specifically for the major advantages of stored-energy closing—has been announced by I-T-E Circuit Breaker Co., Philadelphia, Pa.

The new 13.8-kv equipment introduction marks completion of the redesign of I-T-E's entire line of power circuit breakers to incorporate stored-energy systems. The complete line includes K-Line low-voltage breakers, introduced in 1957, and 4,160-volt equipment, introduced in 1960.

The breakers also incorporate face - wound blowout coils throughout the four interrupting ratings of 250-, 500-, 750-, and 1,000-mva.

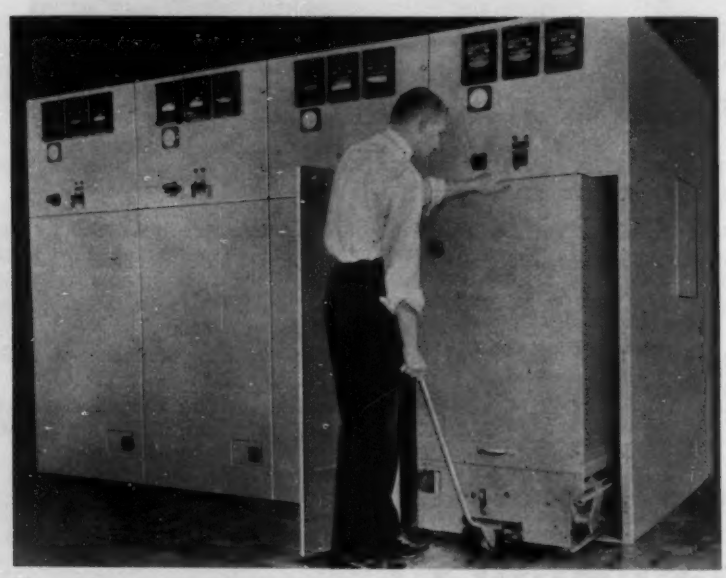
The result is a major advance in terms of greatly improved fault protection, increased safety for personnel and equipment, higher reliability, virtual elimination of the need for pre-operating adjustments, enormously improved ease of handling, and simpler installation, maintenance, and service.

The types of switchgear construction available include the conventional indoor arrangement, and two types of outdoor configurations: standard enclosed and full walk-in.

The 13.8-kv gear is used by electric utilities, industrial plants, commercial buildings, and institutions for the switching, control, and protection of distribution circuits, generators, motors, transformers, and a wide range of other electrical equipment and machinery.

Major advances of the new circuit breakers include:

(1) **Stored-energy closure**—employing a motor-charged, spring-powered mechanism which provides faster contact closings, enormously improved contact life, and greater safety.



The equipment was designed to incorporate the stored-energy closing principle and for virtual elimination of pre-operation adjustments. Here a breaker is being returned to its switchgear compartment.

(2) **Face-wound blowout coils**—which provide faster fault interruptions through the improved arc extinction afforded by an evenly distributed magnetic field. Weight of arc chutes also is reduced significantly to provide easier handling and maintenance.

(3) **Compact size, low center of gravity** — which permit smaller over-all size of switchgear, far easier and safer handling. Because of extremely light weight, 250-mva breaker can be handled by a single person. Other three ratings require only two men for handling during maintenance. Breaker height has been reduced ten inches.

The new switchgear construction also incorporates these design advances:

(1) **Closed-door drawout** — permitting movement from operating to test and disconnect positions with compartment door closed for personnel safety and to keep aisles free from obstuctions.

(2) **Reduced size** — to save installation space and provide easier handling with greater free aisle space. Depth has been reduced as much as 18 inches, making the equipment the shallowest of any available. One standard width is used for both breaker and auxiliary compartments.

(3) **Closed-door indication** — opening a small sliding panel reveals an indicator showing breaker position—connected, test, or disconnected — with compartment doors closed. Breaker contact status — open or closed — also is mechanically indicated and can be observed. Indicating lights on the instrument compartment door show contact status electrically.

(4) **Improved bus, wiring design** — with full voltage, track-resistant, flame-retardant insulation on all bus. Heavy porcelain insulators are used to isolate bus bars passing between rear and breaker compartments, between frames, and they are used as stand-offs within the rear compartment. Simple, air-

(Continued on page 128)

FOR THE *Years Ahead*

Building a *truly better* watthour meter is a goal that might seem impossible in accomplishment when compared with standards already attained. With careful deliberation and decision, Duncan has achieved this end in the TYPE MQ meter, now in full production in all Classes—10, 100 and 200.

The meter incorporates Duncan's shielded top magnetic bearing. The new design also provides for front removal of the rotor through new positioning of high energy, surge-resistant Alnico damping magnets. Positive end play control of rotor . . . separable electromagnets . . . simplified assembly and adjustment are "user approved" features. *Let us give you the complete story.*

"Thinking Ahead . . . Moving Ahead
. . . to stay Ahead of Demand"

WATTHOUR METERS MOUNTING DEVICES DEMAND METERS

AIEE meeting hears T&D problems

◆ Transmission and distribution papers comprised a considerable part of the annual Winter General Meeting of the American Institute of Electrical Engineers, recently held in New York City.

Following are reports on those papers of general significance to electric utility engineers.

Various factors affect substation site selection

"Selection, acquisition, and development of substation sites become more difficult as electric utility loads continue to grow," declared W. A. Conklin, Consumers Power Co., Jackson, Mich., in a paper, "Factors to Consider in the Selection of Substation Sites."

Distribution substations and transmission lines should be located on main thoroughfares and the substation should be located on or adjacent to commercial property. Because greater utilization of land will be required in the future, sufficient area should be purchased for substation sites and rights-of-way.

A site should not be abandoned because of unsuitable soil conditions if it meets all the other requirements.

"Select the site on the basis of the line exit arrangement that can be accomplished and keep the number of exit poles to a minimum," the author recommended.

In order to insure availability when needed, transmission substation sites should be purchased five years in advance and distribution sites should be purchased two to three years in advance of construction.

When purchasing substation sites in cities, a close check should be made of the cost of declining residential areas versus vacant area.

A site should be selected where the structure can be set back of the building line on the street, especially on areas adjacent to residences. The site should be landscaped to blend with adjacent areas.

"Weigh the noise consideration carefully and obtain a minimum of 60 to 80 feet separation between the transformer and residence if possible. Separation of 100 feet is recommended if a 10,000-kva transformer is to be used. Main thoroughfares have a higher ambient noise level, which will allow a higher tolerable level . . . .

"Adequate provision for expansion in the future will alleviate many difficulties in all types of areas. Concern of the last few years has been with rapid residential expansion and this will continue.

"However, larger potential loads will probably be found in what are now the older and declining sections of the cities. Transportation to these areas is being provided by expressways. Renewal projects will be taking place to develop these areas to their highest and best use. "Apartment housing, small industry, shopping centers, educational institutions, civic centers, and so on will all be part of a planned development. Utilities who have planned their plant with these factors in mind will be amply rewarded."

Surge problem emerges from reduced insulation

"The problem of switching surges emerges as one of the factors of primary consideration in insulation coordination when apparatus insulation is designed at reduced insulation levels," according to "Switching Surges — Part I," presented by the AIEE Working Group on Switching Surges of the AIEE Transmission and Distribution Committee.

"Deenergization of lines and cables shunted by unloaded transformers shows ferro-non-linear oscillation with possible superposed transient oscillations produced by a restrike in the circuit breaker . . . . On switching short sections of bus by means of a disconnect switch, field and analytical studies indicate possibilities of very high frequency overvoltages repeated over a relatively long interval of time with sufficient magnitude to cause arrester operation," the committee reported.

Voltages sufficient to operate arresters on the receiving end transformer have been produced by the energization of a line, particularly with a transformer termination on the receiving end of the line.

Reenergization of a line with trapped charges as in some cases of automatic high speed reclosing can produce surges much more severe than those obtained on energizing or reenergizing a line with no initial charge.

Under certain circuit configurations and system parameters transient voltages can occur at a remote location greater than those at the switch location. Interrupting small inductive currents such as the magnetizing current of some transformers and the inductive reactive current of reactor loaded transformers can give rise to transient voltages from current chopping sufficient to sparkover arresters.

The Lightning Protection Devices Section of NEMA is giving consideration to obtaining industry performance values on the sparkover of arresters for voltage waves rising to crest in 40 and 400 microseconds, respectively. In this manner, by filling in the band between the lightning impulse and 60-cycle regions, the volt-time characteristics of the protective level of arresters will be known in greater detail.

AEP supplements NESC wind, ice requirements

"Wind and Ice Design Loads for Transmission Lines of American Electric Power Company" was presented by R. L. Retallack and E. S. Zobel, both of the American Electric Power Co.

The intent of the National Electrical Safety Code wind loads is that heavy loading is greater than medium loading, which in turn is heavier than light loading. This is not true for the Fourth

This modern automobile and this Kuhlman transformer have one thing in common... *they both have the same finish!*

DuPont "*LUCITE*" Acrylic Lacquer, the same weather-resistant, performance-proven finish used on modern automobiles for the last several years, is now offered on Kuhlman pole-type transformers.

Millions of modern-day automobiles and extensive Kuhlman laboratory tests prove *LUCITE* finish stays brighter—weathers and chalks less than ordinary paints. Its acrylic content, as opposed to alkyd types, keeps the finish beautiful and bright for a much longer period of time.

4 Step Transformer Protection

Drawing on the success of the automotive industry, DuPont and Kuhlman engineers developed a 4-step process to assure the same results for transformers: (1) First, all surfaces are thoroughly cleaned; (2) Then, a primer is applied to prevent corrosion; (3) Next comes a sealer to assure adhesion and prevent chipping or peeling; (4) Finally, a coat of high-luster, weather-resistant *LUCITE* Acrylic Lacquer, with the lowest erosion rate of any finish available today.

What *LUCITE* has done for automobiles, it will now do for your transformers. Get this wonderful, new finish at no extra cost on your Kuhlman transformers this year.

KUHLMAN TRANSFORMERS

KUHLMAN ELECTRIC COMPANY, Birmingham, Michigan

Manufacturers of transformers since 1894

Southern Division: CRYSTAL SPRINGS, MISSISSIPPI

Edition of the Code for conductor diameters of 1.0 inch or larger, and also is not true for the Fifth Edition for conductor diameters of 0.4 inch or larger.

The requirement that wind loads and ice loads be considered to occur simultaneously is the cause of these inconsistencies in wind loads of the NESC.

AEP supplementary requirements to the NESC have been established which are based on wind and ice loads occurring at different times, not simultaneously.

"The AEP wind load recommendations are approximately equal to the Fourth Edition requirements for the larger diameter conductors and approximately equal to the Fifth Edition requirements for the smaller diameter conductors based on transmission lines. The AEP supplementary wind loads were found to better provide for the requirements of the AEP territory than the NESC Fifth Edition wind loads, especially for the larger diameter conductors.

"The AEP supplementary ice loads provide for more severe ice loads than the NESC without excessively increasing structure costs, yet produce cable tensions similar to those produced by the combined NESC requirements."

Loading can be reduced by 34.5-kv transformer

"Any comparison of the relative economics of subtransmission and primary supply should take into account the deferment of primary system expansion if the new loads are served at the higher voltage."

So stated Robert H. Sarikas, Illinois Power Co., Decatur, Ill., in a paper, "Use of 34.5-kv Supply to Reduce 4.16- and 12.47-kv Distribution System Investment."

Existing or future load on distribution substations and primary lines will be reduced by the installation of 34.5-kv line transformers.

"The present worth of the revenue requirements of primary facilities which would be needed if load was not served directly at 34.5 kv are the savings which offset to a varying degree the higher initial investment of 34.5-kv equipment. Protection problems, principally the danger of overvoltage due to line-to-ground faults, limit the application of 20/34.5-kv equipment with a 150-kv BIL."

The use of the lower BIL, however, has resulted in greatly reduced transformer costs, thus permitting subtransmission supply of spot loads as small as 150 kw, assuming equal availability of subtransmission and primary supply lines at the load location.

Present worth approach optimizes design for loads

Rapid consideration of many seemingly feasible alternatives and the engineering and economic evaluation of these alternatives were discussed in a paper, "Present Worth Approach for Optimizin Distribution Transformer and Secondary Designs to Serve Growing Loads," presented by R. P. Burandt and J. A. Hughes, Commonwealth Edison Co., Chicago; and A. D. Patton and D. N. Reps, Westinghouse Electric Corp.

The paper discussed ". . . the element of time in distribution transformer and secondary planning. The problem this method solves is the optimization of distribution transformer and secondary design to serve growing residential loads. In solving the problem, a newly developed digital computer program is employed."

Use of this program permits choosing the "best" initial and subsequent distribution transformer and secondary combination, in order to minimize the present worth of all future revenue requirements, and in general, it enables the distribution engineer to establish the practices which are most satisfactory in accomplishing his company's objectives "with regard to service and over-all system economy."

Although the study was confined to optimum transformer-secondary design, the authors state that there is every reason to believe that the ". . . basic concepts and techniques employed would be equally as valid and correct when applied to other portions of the distribution system."

Digital computer program aids planning for systems

Procedure and, to a certain extent, the philosophy of a new dynamic distribution system planning digital computer program which includes consideration of the components, characteristics, and economics of the distribution transformer and secondary system were outlined in a paper, "Distribution System Planning for Growth, Part I — Secondary System Program Development," prepared by M. W. Gangel and R. C. Ender, both of the General Electric Co.

"The program permits comparison of the system design which would be selected based on minimum capitalized costs at year zero with that system which would be selected initially based on the accumulated present worth of annual costs of labor, loss, and money cost, as well as the rate of load growth."

The program employs the element of time with its associated load growth and present-worth economics. System design is based on growth and change, elements which, in the past, have contributed significantly to making the problems confronting the distribution system planner so formidable.

"It is recognized that involvement of the future requires that certain conditions be predicted and that present decisions will be made based on these predictions. There are historial indicators and procedures to use as a basis for making reasonably accurate predictions. Not only the future, but even some of the present time level conditions may not be known to the same precise degree that the program is capable of working with them. Possible variation in estimated values of any input quantity corresponding to a specific system is provided for in the program so that a range of probable values of that quantity can be investigated and the effect of its variation determined."

Protection policy guides come from model study

Valuable guides in establishing feeder protection policy were derived from a study that utilized a system model to examine some of the principles of protection of 12-kv class feeders.

These guides were presented in a paper entitled, "Analysis of Feeder Service Continuity," presented by J. E. McNabb, Westinghouse Electric Corp.

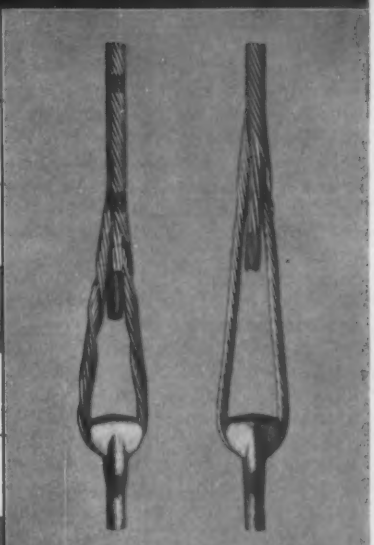
Results of the study indicated that very little improvement in reliability can be obtained by sectionalizing the main, generally speaking. "Sectionalizing the laterials is the solution when any

Best buy for dead-ending a guy...

FANNER *Superformed** FANNGRIPS

COMPARE THE DIFFERENCES BEFORE YOU BUY HOLDING DEVICES

	Fanngrips	Automatic Jaw Types	Bolted Clamps and Clips	Manually Moused or Served
EXPERT INSTALLATIONS EASY with little skill, no tools or dies	YES	YES	NO	NO
NO-SLIP GRIP even for highest loads	YES	?	NO	NO
STREAMLINED FLEXIBILITY without excessive weight	YES	NO	NO	YES
DURABILITY at lowest cost	YES	NO	?	?
SIMPLICITY with highest strength, efficiency on EHS strands	YES	?	NO	NO
HIGH VIBRATION-FATIGUE RESISTANCE	YES	NO	NO	YES
RE-USABLE with lasting efficiency	YES	?	YES	NO



FANNGRIPS are available with open-loop design (left) for flexibility and resilience upon impact, or closed twisted-loop in many sizes for compactness where space is scarce.

Fanngrips . . . time-proved, top-quality research/development products of Fanner, world's FIRST MAKER of machine-formed armor rods . . . provide the best available means for guying pole structures.

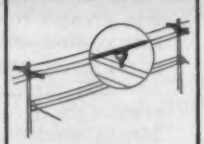
In addition to the cost-saving advantages shown above, Fanngrips are the only non-slip dead-ending device without biting, strand-weakening jaws.

They provide maximum installation-safety, too. Wires are chamfered at ends, surfaces smooth. No burrs or jagged points to cut hands or snag gloves.

Available from stock for all sizes of galvanized steel, aluminum or copper-covered steel strands. They can also be supplied in other metals to match the strands they hold. Ask your Fanner representative for details, and for Bulletin FG-1 containing graphs for estimating savings in costs of guying materials.

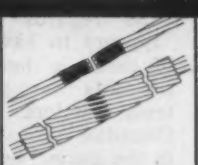
A FEW FANNER Superformed and FINEST PLASTIC PRODUCTS

ARMOR RODS . . . Protect long spans at supports



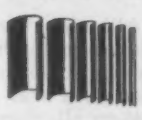
LINEGUARDS . . . Protect short spans at supports

FANNGRIPS . . . For dead-ending strands or conductors



FANNSPLICES . . . For joining or patching strands

Plastic TREEGUARDS . . . Protect conductor surface covering



Plastic KOVER-GUARDS . . . Protect surface-mounted conductors

*A superior forming method in accordance with Patents No. 2,769,478 and 2,588,663—other patents applied for.

THE FANNER MANUFACTURING COMPANY
Brookside Park • Cleveland 9, Ohio

DIVISION OF TEXTRON, INC.

Fine Fanner Superformed Products

A-4025A

extensive correction is contemplated . . . . In general, the greatest improvement in feeder reliability can be achieved by sectionalizing the longest laterals."

It was pointed out that the selection of the proper device or combination of devices to achieve this sectionalizing must be made on the basis of both cost and performance, and the relative weight of these factors is difficult to establish.

"Fuses are inexpensive, under ten cents per kva for typical cases studied, but many coordination problems were encountered. In fact, only for densities below 2,600 kva per square mile can all fuses on the feeder be coordinated in the example case. This means many extended outages due to temporary faults and also involves expense of re-fusing for these temporary faults."

This coordination problem can be avoided successfully if sectionalizers are used, and these can be provided for about 50 cents per kva. Their positive coordination, insensitivity to system changes, and the fact that they require no engineering time for applications are advantages.

Reclosers provide the ultimate in system protection, and no momentary interruptions will take place on the feeder for faults in zones which are protected by the recloser, but a significant cost premium is involved. It costs about $3 per kva to protect the entire feeder system with reclosers.

The ideal system protection policy would undoubtedly include all three of the devices. "Possibly short laterals with low probability of outage would be protected with fuses regardless of coordination problems."

All-aluminum tower line built near Philadelphia

Although the use of structural aluminum in the electrical industry has blossomed since World War II, it was not until last year that an all-aluminum transmission tower line was built in the United States.

Details of the novel line, built by the Philadelphia Electric Co., were given in a paper, "All-Aluminum Transmission Tower Line," prepared by A. H. Sellers of PEC, and J. E. Williams of the Aluminum Company of America, Pittsburgh, Pa.

The all-aluminum tower line is 2.8 miles in length and part of the company's new Eddystone Generating Station complex. It extends from a substation near Marcus Hook, Pa., and across the Delaware River, where it interconnects with two New Jersey utilities.

One side of the towers carries a double circuit 220-kv line, and the other a new 132-kv line and an older 66-kv line that previously had been carried on steel towers which were removed to make way for the aluminum towers.

This use of aluminum "results in a structurally sound assembly which is easy to erect and pleasing in appearance," the authors said. "Aluminum eliminates the expense and line outages incidental to painting.

"At the present time, it is competitive with steel from an economic standpoint when used in areas of industrial atmosphere. Further weight reduction in aluminum members can be achieved by further study of the almost unlimited variety of shapes made possible by the extrusion process."

Lightning study improved by 'Monte Carlo' method

Gambling and a study of one of nature's most potent forces—lightning—were equated in a paper, "Monte Carlo Calculation of Transmission Line Lightning Performance," prepared by J. G. Anderson, General Electric Co., Pittsfield, Mass.

"Estimating the likelihood of winning in a gambling game and estimating the lightning performance of new transmission lines are in many ways similar processes," he said. "Both are concerned with making useful predictions from situations containing random processes; and in both, relationships involving probabilities dominate."

As regards lightning, nature "appears to have a marked deck of cards in her possession. This prevents her plays from being truly random, and create non-Gaussian probability distribution in the game," he commented.

Nature, however, is "a creature of habit, and once her methods of play are found from field data, one can be reasonably confident that in the future she will continue to play in the same way, albeit with certain erraticness from year to year."

Calculating transmission line lightning performance by means of a computer was termed "the Monte Carlo" method, he said. Monte Carlo was the code name for a method of calculating neutron diffusion through materials in secret work at Los Alamos during World War II. To date, lightning outage rates of nine different transmission lines have been calculated by the Monte Carlo Method.

"The method appears to yield very practical results and adapts nicely to investigation of specific aspects of lightning performance. It is inherently more accurate than present methods using limited stroke characteristics."

Adoption of universal EE standards of safety urged

Adoption of universal electrical engineering safety standards was urged by J. W. St. Andre. The electrical industry for many years has had safety standards for equipment and installations, but safety rules have been drawn up by individual utilities and users of electrical equipment, and no general safety standards have been adopted, it was pointed out.

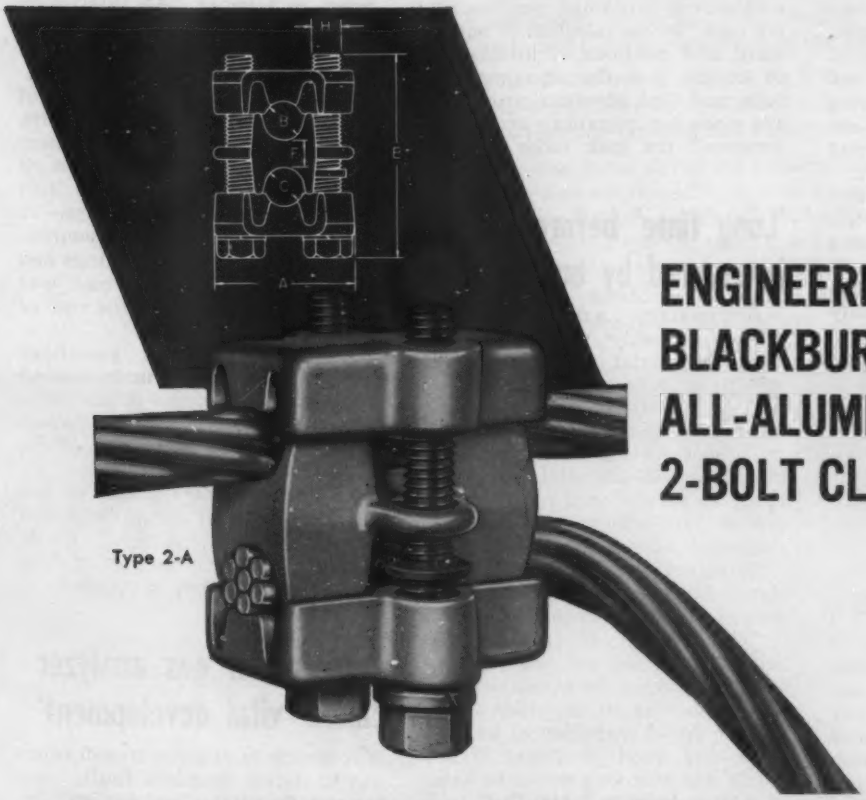
"Sound electrical engineering safety standards should take their place alongside accepted standards for equipment and installations practices," Mr. St. Andre, of Kaiser Aluminum & Chemical Corp., Newark, Ohio, told a symposium on industry and safety in a paper, "Electrical Engineering Standards for Industrial and Commercial Power Systems."

Mr. St. Andre pointed out that while electrical equipment is manufactured with safe operations in mind, in actual use it often is required to handle current and voltage for which it was not designed, and frequently the operator is insufficiently trained in the safe use of the equipment.

As electricity plays a greater and greater role in industry, commerce, and community life, electrical equipment using high voltage and current is being used increasingly by untrained personnel, Mr. St. Andre said.

In urging the adoption of safety standards, Mr. St. Andre observed that too often "we bank on the 'other fellow' to know how, when, and what to do in regard to safety."

Electrical engineering safety standards would "pay off in reduced hazards" by better design, more adequate electrical equipment, assisting purchasing agents



Type 2-A

ENGINEERED INTO BLACKBURN ALL-ALUMINUM 2-BOLT CLAMPS...

ALL WEATHER PROTECTION

On Aluminum or Bi-Metallic Connections

Contact surfaces guarded by rainshield design of castings—inhibitor will not "wash out" even under driving wind and rain.

Condensation is drained off through ports in castings regardless of installation position—never allowed to accumulate around the conductors.

Designed with hot stick crews in mind.

Massive all-aluminum clamp—including hardware—may be used on aluminum or on copper conductors with inhibiting compound. Extra thick, highly conductive aluminum spacer separates dissimilar conductors for added corrosion protection.

Four clamps accommodate a wide range of wire sizes—main from 6 to 795 ACSR, tap from 8 to 397.5 ACSR. Write for samples and literature.

LIVE BETTER ELECTRICALLY

For complete information and test data: Send for Bulletin #6003

Jasper BLACKBURN Corporation

1525 Woodson Road • St. Louis 14, Mo.

to get better equipment, elimination of bad installation practices, informing personnel of potential dangers, interpreting codes and other safety information, reducing the possibilities of repetitive errors in design, and establishing operating rules and regulations.

"All these factors will promote a safer, more trouble-free electrical power system and guarantee a minimum of downtime due to electrical trouble. Operating personnel will thus be more fully protected in their daily task and the equipment itself will continue to perform as it was intended to do when installed.

"This all adds up to better production effort and a better profit picture for management."

Task force offers code for high voltage systems

Because of the growing use of higher voltage electrical systems in commercial buildings and operation of them by relatively untrained personnel, such as hospital maintenance workers, a task force of the American Institute of Electrical Engineers has drawn up a guide for installing such equipment so they will be safe as possible.

This was announced in a paper, "Guide for the Installation in Buildings of Wiring and Equipment over 600 Volts."

It outlined the preliminary report of a task force of the AIEE industrial and commercial power system committee. D. C. Michael, of Cincinnati, was chairman of the task force.

The paper pointed out that load center type distribution systems, ranging from 2,400 to 14,000 volts, have been used extensively in industrial plants, but this type is now being used for large commercial buildings because of increased lighting demands and air conditioning.

These buildings, however, "lack the training safety and maintenance staffs of industrial plants." Rarely, if ever, are employees qualified to operate and maintain electrical equipment energized at voltages over 600.

"This raises the question of whether the National Electrical Code rules for the installation and equipment over 600 volts are adequate under these conditions," the task force commented.

The increasing practice of using voltage distribution systems in commercial buildings requires extra care "in the selection of equipment and methods of installation to insure that the equipment is safe, and that adequate provisions are made for operations and maintenance," the task force said.

'Long time' before power is assured by automation

Automation and electronic brains probably will take over many industrial functions but it will be a "long time" before they will play a major role in assuring reserves of electric power.

These reserves, known as spinning reserves—standby generators ready to take over if normal generation fails—depend on the good judgment of engineers.

So reported C. K. Duff, of the Hydro-Electric Power Commission of Ontario, Toronto.

"The amount of spinning reserve to be carried and its distribution among the available generating sources are decisions which require much experience, knowledge, and good judgment if security and economy are to be kept in proper balance," Mr. Duff told a systems controls symposium in a paper, "Spinning Reserves on a Large Interconnected System."

"The time may come when all the many factors involved can be fed into a computer which will produce the answers in a few minutes, but for years to come the field will be one in which human judgment is called upon to weigh these considerations."

Mr. Duff's paper dealt with the spinning reserve problem on his own utility and interconnections with Michigan and New York and Quebec utilities.

Overhead electric cable utilized in paraffin plant

The 265-ton per calendar day paraffin wax plant of the Atlantic Refining Co., Philadelphia, recently constructed by the Badger Manufacturing Co., Cambridge, Mass., has utilized overhead interlocked armor to distribute high voltage electric power.

Cable of this type is comparatively new and there are few such installations in refineries, compared with conduit and wire.

The report was made by W. E. Burpee, of the Badger Co., and S. P. Axe of the refining company, in a paper, "An Interlocked Armor Cable Installation in a Class I, Group D, Division II Area."

Approximately 25,000 feet of cable, carrying up to 13,000 volts, have been installed. The authors said that the average weight of the cable is 75 pounds per foot lower than conduit and wire—70 pounds compared with 145 pounds, and, neglecting cost of fittings and terminations, the cable cost was 15 per cent lower than the cost of conduit and wire.

Atlantic's electrical specifications do not approve underground installations "because of the congested pipeline network below grade and the oily condition of the soil," they observed.

". . . the economy, ease of installation, circuit flexibility, and simplified maintenance. . . will greatly increase the use of this type of cable," they concluded.

Transformer gas analyzer called 'vital development'

A device to analyze transformer gas to detect incipient faults was termed "a vital development" in the field of protection and maintenance.

The detector "for the first time makes available an effective and sensitive means for detecting low-energy incipient faults in power transformer having gas space above the insulating oil," a transformer session was told.

The gas detection development was described by P. S. Pugh, American Electric Power Service Corp., N. Y., and H. H. Wagner, McGraw-Edison Co., Canonsburg, Pa., in a paper, "Detection of Incipient Faults in Transformers by Gas Analysis."

The need for a detector has been recognized for many years, and failures of some of the largest high-voltage transformers in this country and Europe in the last few years "have caused growing concern," they reported.

Incipient faults in oil-immersed transformers cause local heating which decomposes solid insulation and oil with consequent production of some 16 different gases, analysis of which will indicate an incipient fault.

The two engineers reported that the gas detector "provides for indication of incipient faults before they can develop into complete failures. Gas samples are taken

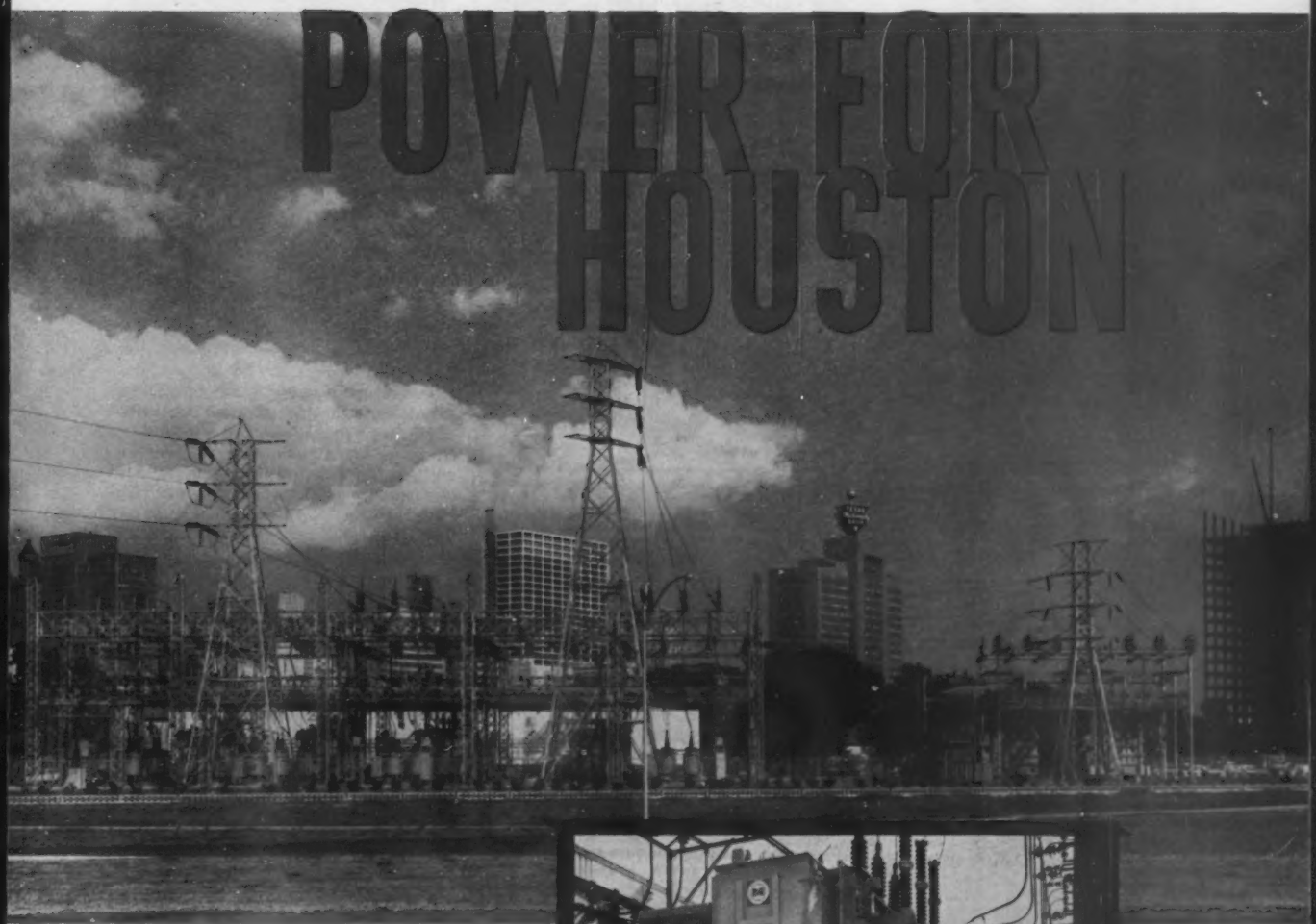
(Continued on page 127)

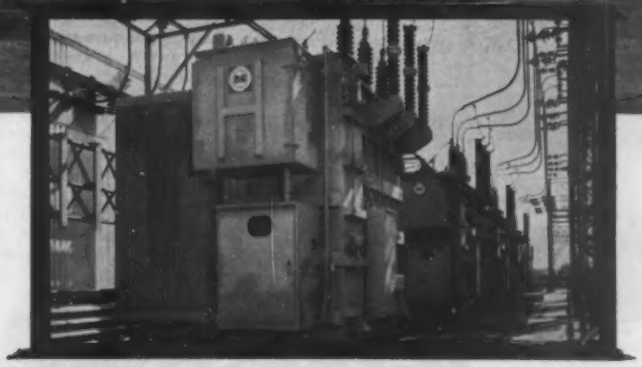
The City of Houston has experienced a steady upsurge in population for years. This thriving and expanding city now ranks 7th in population in the nation.

One of the many reasons for this remarkable growth is the dependable and excellent power service supplied by the Houston Lighting and Power Company.

The view below shows the building activity now in progress in downtown Houston. It also shows a substation that is equipped with six 25,000 KVA LTC Moloney Transformers. Moloney Electric takes great pride in its selection to contribute to the expanding power needs of bustling, growing Houston . . . A model example for urban and industrial expansion everywhere.

POWER FOR HOUSTON





Closeup of Downtown Substation showing six 25,000 KVA, Moloney LTC Transformers.

ME61-5

MOLONEY ELECTRIC COMPANY

MANUFACTURERS OF TRANSFORMERS FOR UTILITIES, INDUSTRY AND ELECTRONIC APPLICATIONS

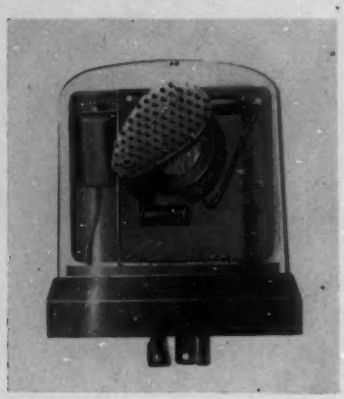
FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CAN. • SALES OFFICES IN ALL PRINCIPAL CITIES

New utility equipment

Micro photo control

Lumatrol Mark I, a new photo control manufactured by Micro Balancing, Inc., 191 Herricks Rd., Garden City Park, L. I., N. Y., promises unprecedented reliability in automatic switching of street lights.

Unusually compact and lightweight, the Mark I utilizes a simplified circuit employing Varistors in conjunction with a secondary lightning arrester. Studies show that transient voltage surges in secondaries, which are below the spark-over of lightning arresters, are the number one source of control failure.



Lumatrol Mark I controls are said to withstand all transients up through the capabilities of the secondary arrester. Intensive field tests and numerous installations of the new units have indicated no failures of the control due to this cause.

Write U-301 on reply card, pg. 17

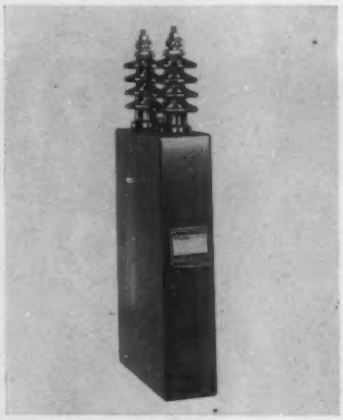
Ohio Brass capacitors

New 50-kvar Varex capacitors made by Ohio Brass Co., 380 N. Main St., Mansfield, Ohio, are 23 per cent lighter and 25 per cent thinner than the former design, and have one of the lowest over-all heights known to be available. The size and weight of 25-kvar Varex units have also been reduced proportionately.

Available with up to 95-kv BIL for 60-cycle voltages from 2,400 to 7,960 volts, the new units retain the standard NEMA mounting dimension of 15⅝ inches.

Also retained in the new lightweight design is the principle of extended foils, said to reduce maximum current density in the foil to one fifth that of conventional designs, and to provide better heat dissipation from the dielectric.

Solder-sealed wet-process porcelain bushings are supplied with stainless steel safety-strip studs and Belleville springs to insure controlled clamping pressure and follow-up. Stainless steel containers have recessed bottoms, are protected with abrasion-resistant epoxy-resin finish.



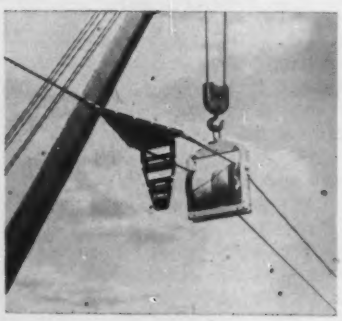
Write U-302 on reply card, pg. 17

S&R running board, block

Sherman and Reilly, Inc., First and Broad Sts., Chattanooga 2, Tenn., has developed an articulated running board and bundle block which work smoothly and as easily as stringing a single conductor.

The articulated running board conforms to the outside diameter of the center drum and conductor sheaves as it passes through the throat of the bundle block. It is important that the lift on initial contact be held to an absolute minimum.

Under tension, as the front swivel contacts the center drum, the block has a tendency to swing forward. The



Koenig ALL-STEEL UTILITY BODIES

LINE-CONSTRUCTION BODY

. . . available in 9' to 14'6" lengths with mechanical or hydraulic winch and derrick, or any other special or custom equipment desired. Compartments can be arranged to your specifications.

SERVICE BODIES

. . . for ½-, ¾-, and 1-ton chassis. Electrically welded into one unit with six waterproof compartments, recessed paddle handles keyed alike and fender skirt protected with die-formed rolled edges. Built for safe, dependable service . . . will outlast several chassis.

SIDE BOXES

For all pick-up trucks, including the new compacts. Watertight compartments . . . double panel doors . . . recessed paddle handles with cylinder locks keyed alike. Eleven types, seven lengths available.

YOU CAN BE SURE OF QUALITY MATERIALS AND WORKMANSHIP WHEN YOU SPECIFY KOENIG PRODUCTS

Write for literature and specific information today.

Koenig IRON WORKS, Inc.

P. O. BOX 7726
DEPT. B
HOUSTON 7, TEXAS

amount of swing will depend on the amount of lift required to start the board riding over the drum.

This design running board is less than two inches thick and the amount of lift is approximately one-half this thickness, or about one inch. This small amount of lift causes a minimum of forward swing, eliminating need for tie back ropes previously required.

The sheaves have full neoprene lining to serve both as a resilient cushion for the conductor and to prevent scarring of the rim by the running board. The side frame of the block has rounded corners to eliminate fouling.

The counter-weight is articulated also for easy passage and is restrained from swinging beyond the horizontal plane of the board. This weight is necessary to add stability to the board and prevent rotation.

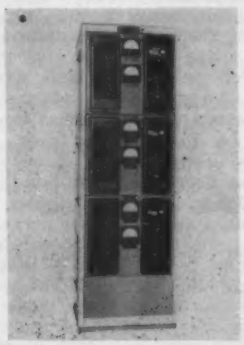
Write U-303 on reply card, pg. 17

Westinghouse wattmeter

A new wattmeter for measurement of transformer core losses and corona losses on high-voltage transmission lines is now available from the Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

The sensitive device is particularly suited to low power factor measurements—two to 20 per cent—where normal wattmeter movements cannot function accurately.

The device consists of an electrodynamic torque-producing mechan-



ism and a d-c balancing element, all mounted on the same shaft and using a taut-band suspension frictionless principle.

When the electrodynamic element is energized, a deflection from the balance position produces an error signal in a photoelectric detecting system, which in turn causes a current to flow in the d-c balancing element to develop opposing torque to the electrodynamic element.

The magnitude and direction of the balancing direct current required is proportional to the power flow in the measured circuit.

This direct current can be used to operate read-out instruments and recorders or telemetering transmitters. The taut-band suspension provides a movement with unlimited resolution —no "dead band" areas.

Write U-304 on reply card, pg. 17

Motorola remote alarms

Motorola, Inc., 4501 W. Augusta Blvd., Chicago 51, Ill., has expanded its remote alarm indicator line to include units for mounting at the base of utility poles.

The new model consists of a 25-watt radio transmitter and a tone coding device, mounted in a pressurized transformer tank to ensure all-weather operation. The tank is covered by a steel hood to prevent tampering.

The transmitter, connected by cable to an antenna on top of the pole, sends out a distinctive tone signal when actuated. In most installations, the unit operates in conjunction with the recloser and is triggered if a line fault causes the recloser to lock out. The alarm signal is radioed to a radio base station and a digital recorder in a centrally located office, notifying utility personnel of the occurrence and location of the line failure.

Recent Federal Communications Commission rule changes permit this type of device to be used to indicate abnormal conditions as well as actual failures. Power utilities may tie indicator sys-

tems to their regular two-way mobile radio networks and use the same standard base station. A total of 290 remote alarm indicators can be included in a single system.

Write U-305 on reply card, pg. 17

Chance disconnect switch

The new type M2 disconnect switch made by the A. B. Chance Co., 210 N. Allen St., Centralia, Mo., was designed specifically for poletop applications were the insulation level of the circuit is based on standard distribution equipment.

Koenig INTRODUCES A REVOLUTIONARY NEW TYPE OF HEAVY-DUTY POWER WINCH

FEATURING TORQUE TRANSMISSION DIRECT FROM GEAR SPIDER TO DRUM . . . NO KEYS TO SHEAR

20,000 pounds safe hoisting capacity

Outstanding features of the NEW KOENIG WINCH:

★ Drum torque load is NOT transmitted by drum shaft . . . no keys to shear . . . torque is transmitted direct from gear spider to drum by means of multiple-splined collar in gear housing.
★ Entire unit, including safety brake, is lubricated by the oil-bath principle, with a generous supply of oil to prevent overheating.
★ Engineered to use standard lubricants available throughout the world.
★ Multiple-plate automatic safety brake, running in oil with one-direction clutch, is easily adjusted or released.
★ Accurate drum clutch position indicator.
★ Gear ratio — 38:1.
★ Nickel-bronze alloy worm gear. Hardened and ground worm mounted on Timken roller bearings.

Model 70B with stationary shaft

Pat. Pend.

Model 71B with catheads

THIS ADVANCED-DESIGN KOENIG WINCH IS RECOMMENDED FOR OIL-FIELD EQUIPMENT, PUBLIC UTILITIES, HEAVY WRECKERS, CONSTRUCTION, AND OTHER HEAVY-DUTY JOBS.

Koenig winches have served the industry with dependable pull and hoisting power since 1934. Koenig also builds a complete line of utility and service bodies.

Koenig IRON WORKS, Inc.

P. O. BOX 7726, DEPT. B • HOUSTON 7, TEXAS

True . . .

photocontrols

are only

one part of

your system

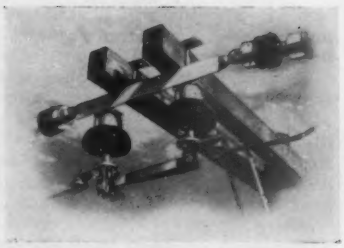
. . . but they may be the *one* part that decides everything. All it takes to keep an otherwise perfectly good street lighting system in the dark (and someone on the carpet) is an "inexpensive", untried photocontrol someone has slapped together just so it would "sell". The worst of it is these "bargains" may work fine for a year or so, and then . . .

How are you fixed for links? Fisher-Pierce Division, Sigma Instruments, Inc., 59 Pearl St., So. Braintree 85, Mass.

FP

FISHER PIERCE

Electrical and Electronic Equipment
for Industry, Utilities and the Home



Insulators are cap-mounted for vertical and underhung applications and bases are slotted for single or double crossarm mountings.

This compact switch is made in 200- and 400-ampere sizes for 7.8 to 27 kv.

Write U-306 on reply card, pg. 17

McCabe-Powers line unit

McCabe-Powers Body Co., 5900 N. Broadway, St. Louis 15, Mo., has announced production of a new Powers-American body and equipment combination designated the series 555 two-man line construction and maintenance body.

The new unit enables a two-man crew to handle construction and maintenance work normally requiring three or four men. The unit consists of a 112-inch body, featuring reduced overhang at rear and designed for an 84-inch CA chassis, equipped with the firm's series PM-30 "Pole-Master" derrick and series DF-1 "Earth-Master" digger.

The body contains bin and shelf-equipped compartments, plus ample hooks, racks, troughs, and open storage space for tools and materials needed on routine and emergency jobs. An underfloor winch line and numerous other optional accessories can be furnished to meet specific work needs.

The derrick, which handles four-ton loads and 55-foot poles, can be mounted on either rear corner of the body. The vertical operating range extends from carrying position to ground; the horizontal range reaches from one side of the body to the other.

In addition to hydraulically spotting and holding in any position, the derrick head sheave can be hydraulically extended and retracted a distance of 56 inches.

Write U-307 on reply card, pg. 17

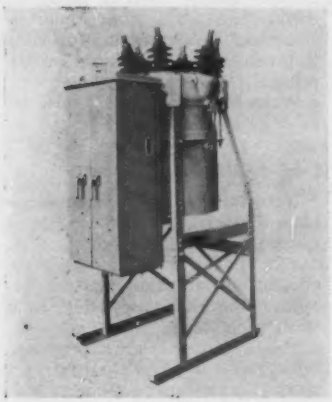
Single-tank circuit breaker

Type AD-28, a single tank oil circuit breaker, with ratings of five cycle, 100, 250, and 500 mva for 14.4 kv and below, has been introduced by Federal Pacific Electric Co., 50 Paris St., Newark 1, N. J., to help utilities and large industrial plants meet the rapidly increasing demand for moderate voltage distribution equipment.

Taking up less space and requiring less maintenance and installation

time than most similarly-rated units manufactured previously, this AD-28 outdoor power circuit breaker is designed to open and/or close on three-phase electric current in the four- and to 15-kv range for the purpose of protecting systems from damage that may arise under normal or abnormal circuit conditions.

Chief feature of Federal Pacific's new AD-28 single tank oil circuit breaker is its exceedingly small size (8¼ feet high, 3 5/6 feet wide, and 3¾ feet long), which reduces the size of the structure required as well



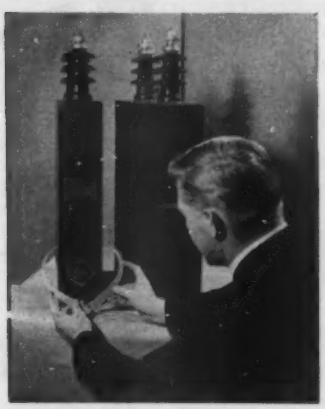
as the area taken up on the ground. To install the breaker, little more than 15 square feet of ground area is needed—which means that users can increase their substation capacity without rebuilding their station or taking up valuable space on the ground.

Another outstanding feature of the breaker is the fact it has been designed with a minimum of parts, only one half the usual number of moving contacts and stationary contacts.

Write U-308 on reply card, pg. 17

A-C low-profile capacitors

Low profile power factor capacitors, made by Allis-Chalmers Manufacturing Co., 938 S. 70th St., Milwaukee 1, Wis., for utility and industrial users, are now narrower and lighter.



Unique Magnetic System

free-floating...surge resistant...self-cleaning

The true magnetic flotation principle used in the Sangamo J3 Watthour Meter is unique! Two bonded cylindrical Alnico magnets with opposing magnetic fields float the disk freely.

The extra high coercive force Alnico material used in the magnetic system retains its strength even through repeated lightning and load surges, assuring accurate long-term registration.

Sangamo manufactures the magnets for precise magnetic and mechanical uniformity to assure performance stability in the J3 floating system. These magnets maintain a visible 1/16 inch cushion—magnetic particles are repelled from the gap . . . eliminating erratic light load registration.

This true magnetic floating system is designed for easy and positive control of disk position and endshake. It never requires costly maintenance or replacement . . . the floating system is guaranteed for the life of the meter.

true MAGNETIC flotation J3

SANGAMO ELECTRIC COMPANY

SPRINGFIELD ILLINOIS

PW61-3

with a *Truco* 8000 lb. Center Mount Derrick

Never underestimate the power of a Truco turret derrick — especially the new compact Universal Center Mount Derrick. Here is a ruggedly built, all around utility tool that lifts, digs, puts a man in the air, sets a pole and installs the hardware. You mount it behind the cab of any standard line body in only 16" of space*. You get 360° rotation of the box-type steel telescoping booms from dual unitized controls. You lift up to 8000 pounds of payload with smooth hydraulic operation while twin hydraulic outriggers keep your vehicle Gibraltar steady.

You'll be able to dig those holes that just couldn't be dug before, too. Truco's new 4-speed hydraulic digger has three conventional speeds plus a brand new super low speed for biting through shale, caliche and hardpan — even anchor holes are possible with ease at *any* angle, in *any* direction. For aerial lift use, add a fiberglass safety basket with airplane-type single stick control.

Before you buy, insist on seeing this multi purpose utility tool in action. Investigate the savings *you* can make on *your* utility jobs — in dollars, manpower and time. See your Truco dealer or write for details.

**Also available for corner mount installations.*

TRUCK EQUIPMENT COMPANY

"The COMPLETE Line of Utility Equipment"

3963 Walnut Street / AC 2-7905 / Denver 5, Colorado

The 50-kvar units, 2,400 through 7,960 volts, measure approximately 25 per cent less in width and are about 23 per cent lighter.

Built to rigid specifications and utilizing high quality, low loss materials, extended foil cooling, and extra low drying and degasification pressures, the new design means more kvar is available in the same space with less weight per kvar.

Higher insulation levels are now available to the user. A greater safety factor is also available, in that the foil principle gives lower current densities at the point of contact between the packed elements and the contact plates than is possible with conventional tab-type capacitor construction. The extended foil construction can withstand higher inrush currents.

Write U-309 on reply card, pg. 17

L-M fault indicators

New fault indicators developed by Line Material Industries, McGraw-Edison Co., Milwaukee 1, Wis., are designed primarily for use on underground distribution systems served by Pad-Mount transformers or Transclosure housings.

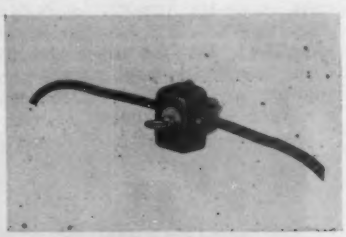
These indicators are current-operated devices with a tentative minimum-trip range between 300 and 450 amperes. The fault indicator can be mounted on all cables from 5/16 to 1-13/16 inches over-all diameter regardless of system voltage.

The exceptionally fast one-half cycle time current characteristic enables coordination of the indicator with all overcurrent protective devices such as reclosers, breakers, or cutouts.

Several advantages offered by L-M fault indicators are as follows:

(1) faults on underground feeders can be located more readily and economically without extensive shutdown time;

(2) service can be restored immediately and permanently to all customers when circuits are re-energized; and (3) faults can be located safely with the circuit de-energized, eliminating the necessity for closing in on faults.



Write U-310 on reply card, pg. 17

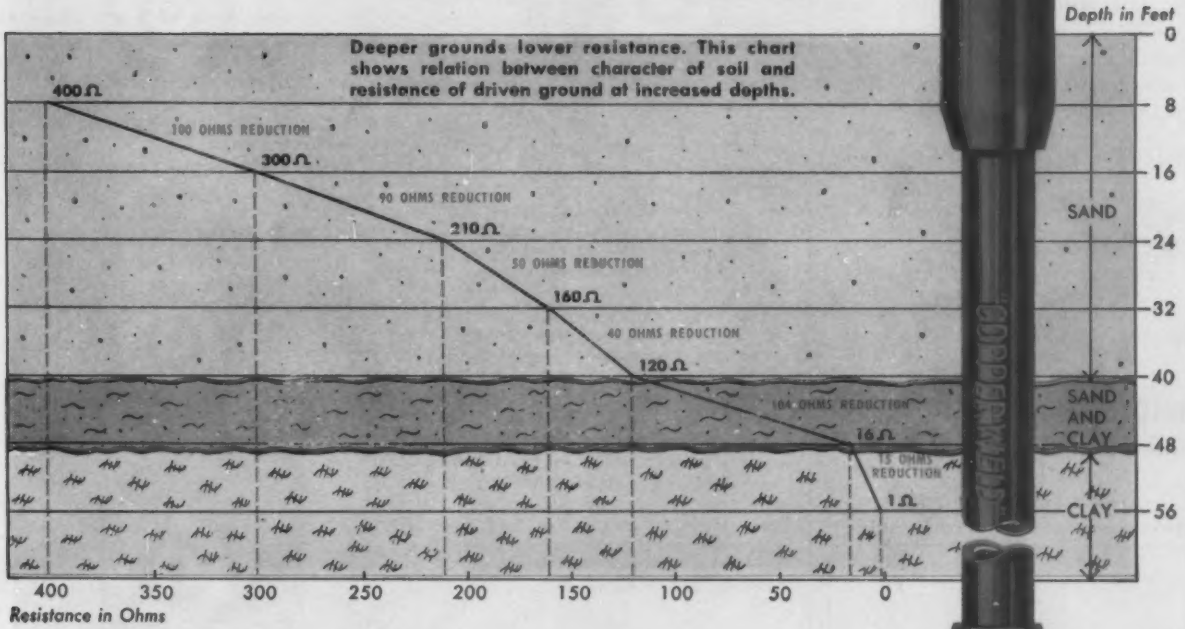
Westinghouse sealant

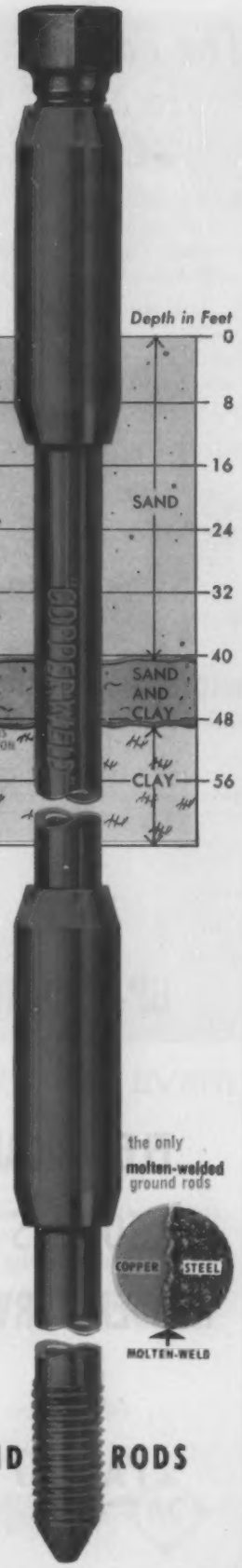
A positive sealant, called "Oyltite-Stik," for emergency sealing of

FOR SAFE GROUNDING . . .

DRIVE DEEP!

TO LOW-RESISTANCE SOIL





In many areas the surface layer of soil has such high resistance that standard 8- or 10-foot ground rods cannot provide suitable low-resistance ground connections. In such areas, dependable, low-resistance grounds may be obtained by driving sectional ground rods deep into the earth to reach good-conducting soil.

Copperweld Sectional Ground Rods are ideal for deep driving. Their tough core of alloy steel provides strength and rigidity for driving in all types of earth. You can drive as many of these sectional rods as needed to reach low-resistance soil. Each section is joined to the other by a bronze coupling, eliminating the danger of corrosion and poor electrical connections. And once they're installed, Copperweld Sectional Rods are in to stay . . . the heavy copper covering over the entire rod, including the threaded ends, provides permanent protection against rusting.

For tops in safety, improved line performance and reduced service interruptions, drive deep with Copperweld Sectional Ground Rods.

Look for the name "COPPERWELD." For your protection, it is stamped on every Copperweld Ground Rod.

Copperweld® SECTIONAL GROUND RODS

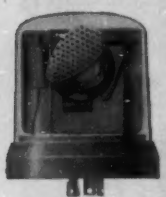
COPPERWELD STEEL COMPANY
WIRE AND CABLE DIVISION *Glassport, Pa.*
For Export: COPPERWELD STEEL INTERNATIONAL COMPANY, New York

The Facts of Life in Street Light Control

1. Big killer of photo controls is transient voltage surges in secondaries which are below the spark-over of lightning arresters.

2. **LUMATROL MARK I** uses Varistors in conjunction with a secondary lightning arrester to withstand ALL transients up through the capabilities of the secondary arrester.

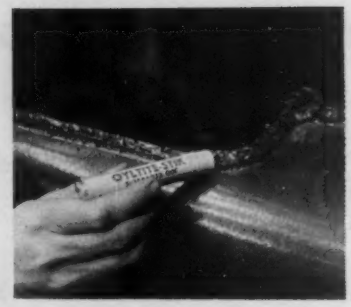
AUTOMATIC... COMPACT... LIGHTWEIGHT... SIMPLE... ...AND COMPLETELY RELIABLE!



WRITE FOR BULLETIN 91a.

MICRO BALANCING, INC.
GARDEN CITY PARK, N.Y.
In Canada: J. R. KEARNEY CORP.
Box 270, Guelph, Ont.

KEEP UP-TO-DATE USE ELECTRICAL SOUTH'S READER SERVICE SEE PAGE 17



transformer oil leaks through cracks or pinholes in welds or joints, is now offered by Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

On rare occasions, oil-immersed transformers may develop small oil seepage leaks which necessitate removal of the transformer from service. This new sealant can repair many of these leaks while the transformer is still in service, thereby eliminating costly service interruptions.

The "Oyltite-Stik" sealant will stop leaks even while the oil is seeping through cracks or splits. It is not affected by temperature changes, and it remains plastic and expands and contracts with the part repaired.

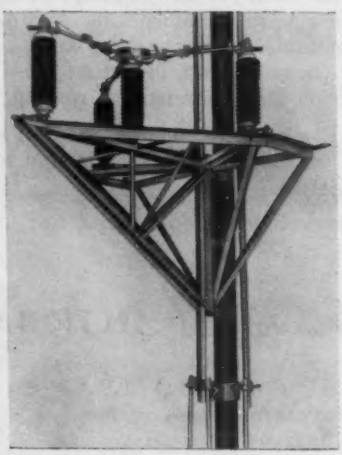
The "Oyltite-Stik" is dark gray in color and comes in a cylindrical form approximately ½ inch in diameter and four inches in length. This stick is similar to a stiff putty, and it is only necessary to rub the "Stik" over the leak several times in order to force the material into the leak.

Write U-311 on reply card, pg. 17

Southern States air switch

Southern States Equipment Corp., Hampton, Ga., is now making available a phase-over-phase, pole-mounted air switch with the trade name of Pole-Pak.

It is available in one-, two-, or three-way models designated types 57L-1, 57L-2, and 57L-3. All three models are available in voltage ratings from 7.2-69 kv and continuous current ratings of 600 and 1,200 amperes.



The Pole-Pak consists of Southern States type 57L braidless air switches mounted on lightweight, welded aluminum frames; a simple operating mechanism for each three-pole unit; and clamping bands to mount each frame on the pole.

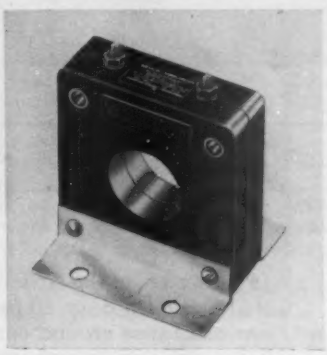
Quick-break arcing horns capable of interrupting the magnetizing current of a 35,000 kva transformer and line charging current of 15 amperes are supplied as standard equipment.

One of the outstanding features of the Pole-Pak is its ease of installation. This is accomplished through the use of unique clamping bands which permit proper positioning and suspension of each pole unit during installation. No drilling of the wood pole is necessary.

Write U-312 on reply card, pg. 17

Weston transformers

Highly improved current transformers, available in a wide number of ranges and at lower cost than previous models, have been introduced by Daystrom, Inc., Weston Instruments Div., 614 Frelinghuysen Ave., Newark 12, N. J.



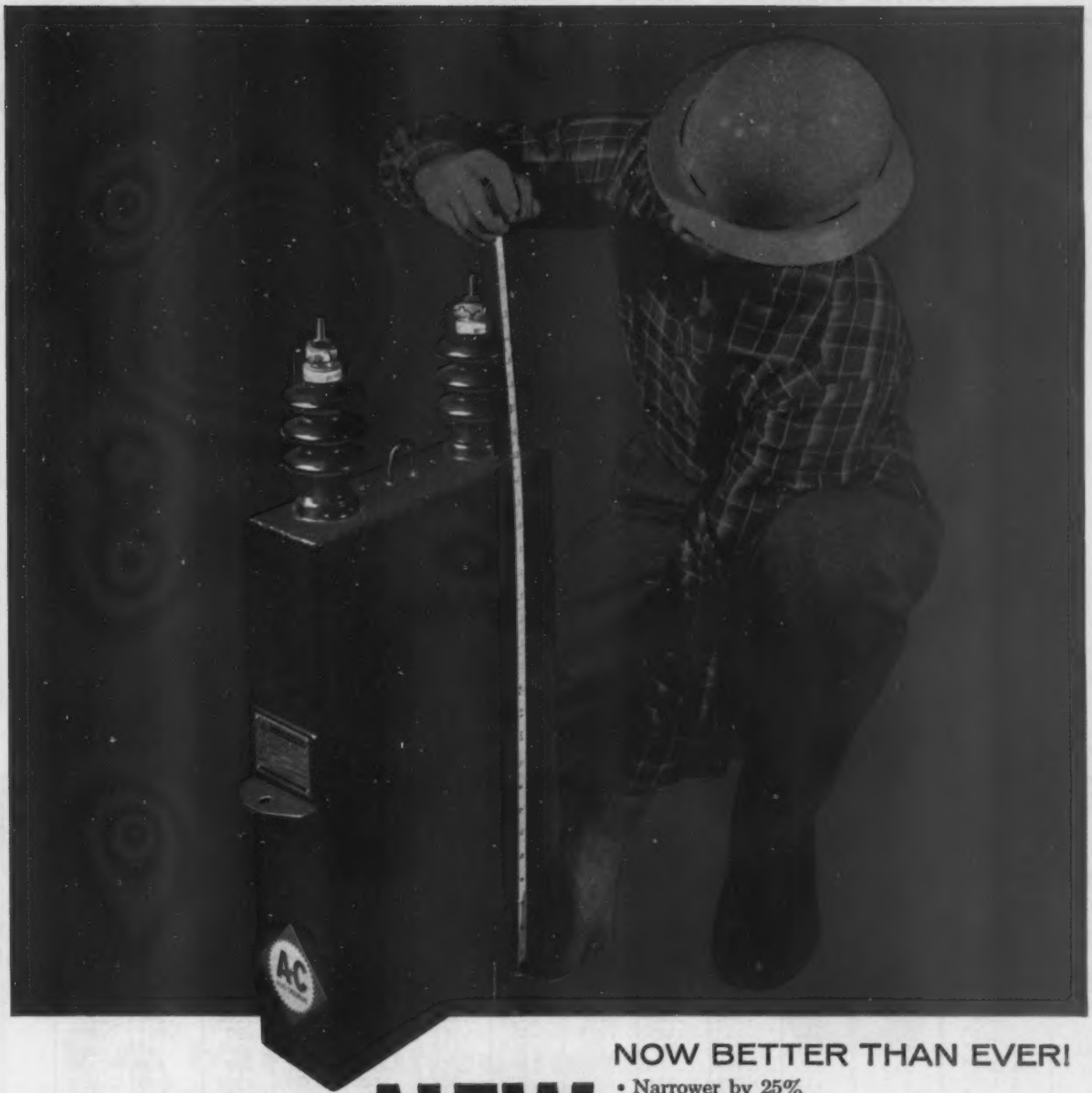
The new transformers, designated models 605 and 607, replace the Weston model 604. Accuracy is such that they can be used with wattmeters as well as ammeters and conformance is to ASA-C57.13 standard accuracy classes.

Completely encased in molded high impact and abrasive resistant plastic, the transformers can be mounted using through bolts or right-angle brackets.

A pair of brackets, including the necessary mounting hardware, is packed with each unit. In place of the former soldered connections, stud terminals are used.

Factory tested at 2,600 volts a-c, 60 cycles per second for five seconds, the transformers operate at a frequency of 25-800 cycles. Model 605 is available in 100:5 through 400:5 ratios in five types. Model 607 is supplied in six types with a ratio range of 500:5 through 1,500:5.

Write U-313 on reply card, pg. 17



NOW BETTER THAN EVER!

- Narrower by 25%
- Lighter by 23%
- Higher basic impulse levels
- Hot spots minimized
- Lower current densities at the contact points
- Low pack temperatures
- Higher inrush current safety factor.

ALL-NEW CAPACITORS

Specify *extended foil* construction to obtain *all* these benefits!

For details call, write or wire . . .

ALLIS-CHALMERS

EXTENDED FOIL CAPACITORS

A-1423

New series of tables extended to include larger hourly rates

A NEW SERIES of estimating tables, completely revised in the light of more recent jobs and experience, are presented in this issue and will appear from month to month in forthcoming issues. These electrical estimating data sheets cover labor only and are arranged alphabetically with the basic material headings as a title for each tabulation.

Labor units given in these tabulations are based on a minimum of interference during work progress. The averages listed do not provide for abnormal job conditions, and any such abnormal conditions will require adjustments by the user, based on his experience.

The work units covered by each table are composed of one or more separate but closely related operations necessary for the complete installation of a particular basic item of electrical equipment. These operations associated with the basic material are described at the bottom of each table.

Most of the electrical estimating tabulations follow the same form. Column 1 at the left shows the size of the material to be installed. The second column from the left gives the time required to install the material, and it should be noted especially that this "productivity" column may be based on individual units or in the case of cable or conduit on units of 100 feet or 1,000 feet. The abbreviations "Ea." for each, "C" for hundreds, and "M" for thousands in Column 2 indicate the basis of the labor hours.

Columns 3 to 13, from the left, give the actual labor costs in dollars per unit of installation, at various hourly wage rates.

When calculations are being made for an hourly wage rate that doesn't correspond to any of the rates listed in Columns 3 to 13, the user may multiply the number of hours in Column 2 by 100 and this will give the labor cost based on an hourly wage rate of $1 per hour. By multiplying this by the hourly wage rate that actually applies in the user's locality, the exact labor cost of the operation may be obtained. Labor costs obtained in this way will be for units, hundreds of feet, etc., as given in heading of Column 2 of the table.

The labor units covered by the tables represent direct job labor costs and do not include delivery of material to site, engineering, estimating, or any other indirect cost.

As will be noted, some of the electrical estimating tabulations to be given will be for independent operations, such as excavating, backfilling, etc. These are included for use in preparing estimates on work of a special nature not covered under a specific table heading.

Tables will appear in alphabetical order.

CONDUIT "IN SLAB" HOTELS AND OFFICES

CONCEALED THINWALL

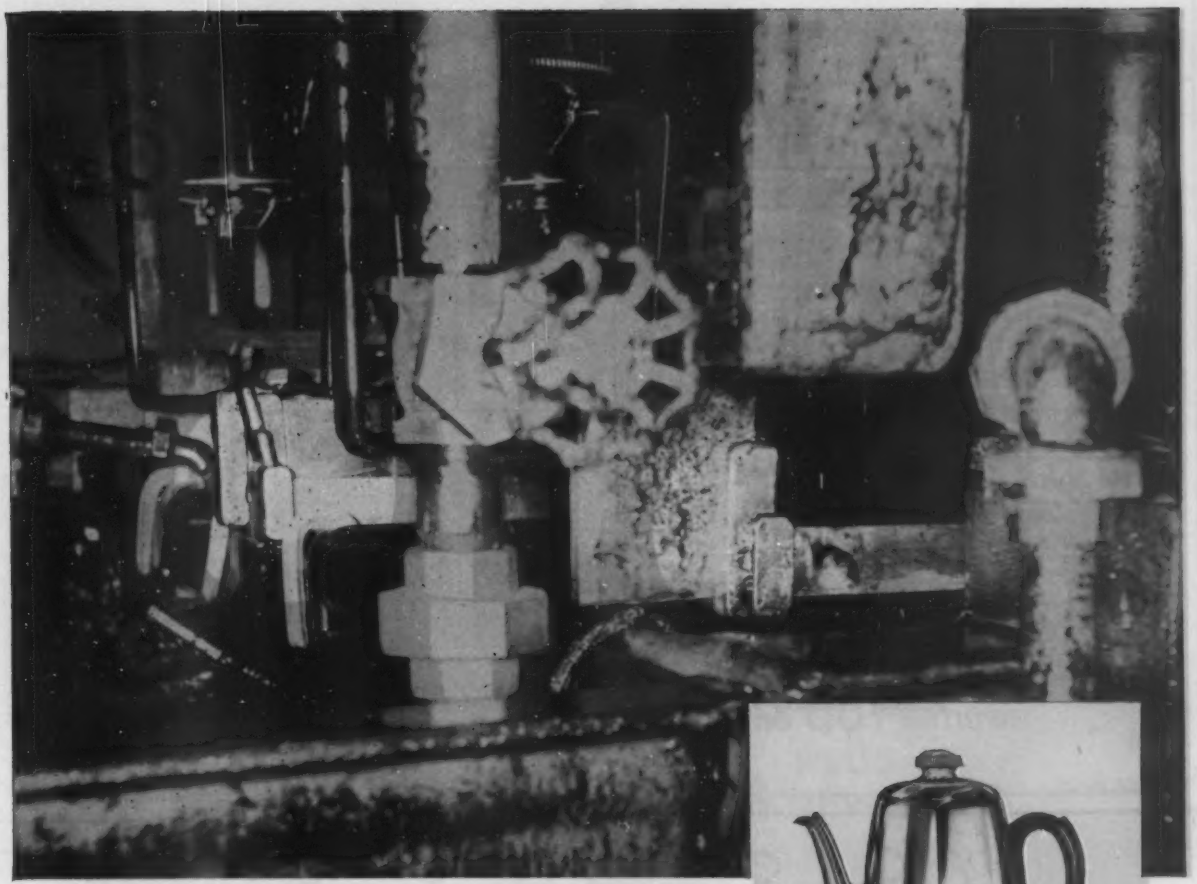
COND. SIZE	HRS. "C"	LABOR COST INSTALLED PER FT. AT FOLLOWING RATES										
		2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50
1/2"	4.6	.092	.104	.115	.127	.138	.15	.161	.173	.184	.196	.207
3/4"	5.0	.10	.113	.125	.138	.15	.163	.175	.188	.20	.213	.225
1 "	5.6	.112	.126	.14	.154	.168	.182	.196	.21	.224	.238	.252
1 1/4"	7.5	.15	.169	.188	.206	.225	.244	.263	.281	.30	.319	.338
1 1/2"	9.3	.186	.209	.233	.256	.279	.302	.326	.349	.372	.395	.419
2 "	10.4	.208	.234	.26	.286	.312	.338	.364	.39	.416	.442	.468
		RIGID										
1/2"	5.2	.104	.117	.13	.143	.156	.169	.182	.195	.208	.221	.234
3/4"	5.6	.112	.126	.14	.154	.168	.182	.196	.21	.224	.238	.252
1 "	6.4	.128	.144	.16	.176	.192	.208	.224	.24	.256	.272	.288
1 1/4"	8.5	.17	.191	.213	.234	.255	.276	.298	.319	.34	.361	.383
1 1/2"	10.6	.212	.239	.265	.292	.318	.345	.371	.398	.424	.451	.477
2 "	12.0	.24	.27	.30	.33	.36	.39	.42	.45	.48	.51	.54

E-102-B

LABOR: Includes handling material at site, bending, cutting, reaming and threading, placing conduit, tying down and connecting at terminus.

3-61

Published by special permission from "Blue Book of Electrical Estimating" by Geo. L. Sherlock, Estimating Handbook Associates, 5848 N. Leonard Ave., Chicago 46, Ill. Copyright 1959.



SUNBEAM
uses CADWELD®
bus bar connections

CADWELD BUS BAR CONNECTIONS are used by SUNBEAM MANUFACTURING CORP. in chrome plating their automatic percolators because of top electrical efficiency under a severe corrosive environment and high current loads.

CADWELD CONNECTIONS are fusion welds and have no mechanical contact surfaces that can be affected by acid drippings as are bolted connections.

Illustrated in the above (unretouched) photo are the main feeder connections to the anode bars over the plating tanks.

CADWELD CONNECTIONS are ideally suited for automatic plating installations and offer maintenance-free, minimum overall cost.

CADWELD® electrical connections

Erico Products, Inc.

2070 E. 61st Place • Cleveland 3, Ohio

IN CANADA: ERICO INCORPORATED, 7 Superior Ave., Toronto 14, Ontario, Canada

CONDUIT "ON SLAB" - HOTELS & OFFICES

CONCEALED THINWALL

COND. SIZE	HRS. "C"	LABOR COST PER FT. INSTALLED AT FOLLOWING RATES										
		2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50
1/2"	4.4	.088	.099	.11	.121	.132	.143	.154	.165	.176	.187	.198
3/4"	4.8	.096	.108	.12	.132	.144	.156	.168	.18	.192	.204	.216
1 "	5.4	.108	.122	.135	.149	.162	.176	.189	.203	.216	.23	.243
1 1/4"	7.1	.142	.16	.178	.195	.213	.231	.249	.266	.284	.302	.32
1 1/2"	8.7	.174	.196	.218	.239	.261	.283	.305	.326	.348	.37	.392
2 "	9.8	.196	.221	.245	.27	.294	.319	.343	.368	.392	.417	.441
		RIGID										
1/2"	5.0	.10	.113	.125	.138	.15	.163	.175	.188	.20	.213	.225
3/4"	5.4	.108	.122	.135	.149	.162	.176	.189	.203	.216	.23	.243
1 "	6.0	.12	.135	.15	.165	.18	.195	.21	.225	.24	.255	.27
1 1/4"	8.1	.162	.182	.203	.223	.243	.263	.284	.304	.324	.344	.365
1 1/2"	10.2	.204	.23	.255	.281	.306	.332	.357	.383	.408	.434	.459
2 "	11.4	.228	.257	.285	.314	.342	.371	.399	.428	.456	.485	.51

E-102-B

LABOR: Includes handling material at site, bending, cutting, reaming and threading, placing conduit, tying down and connecting at terminus.

3-61

CONDUIT (RIGID) PUSHING - UNDERGROUND WITH MANUAL PUSHER

COND. SIZE	HRS. "C"	LABOR COST PER FT. AT FOLLOWING RATES										
		2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50
1 "	13.8	.276	.311	.345	.38	.414	.449	.483	.52	.55	.59	.62
1 1/4"	15.5	.31	.349	.388	.426	.465	.50	.54	.58	.62	.66	.70
1 1/2"	17.8	.356	.401	.445	.49	.53	.58	.62	.67	.71	.76	.80
2 "	20.8	.416	.468	.52	.57	.62	.68	.73	.78	.83	.88	.94
2 1/2"	26.0	.52	.59	.65	.72	.78	.85	.91	.98	1.04	1.11	1.17

E-101-B

LABOR: Includes cutting and threading conduit in 5 ft. lengths, assembling and pushing with a manual pusher. (Leaver and notched steel rail)

3-61

Published by special permission from "Blue Book of Electrical Estimating" by Geo. L. Sherlock, Estimating Handbook Associates, 5848 N. Leonard Ave., Chicago 46, Ill. Copyright 1959.

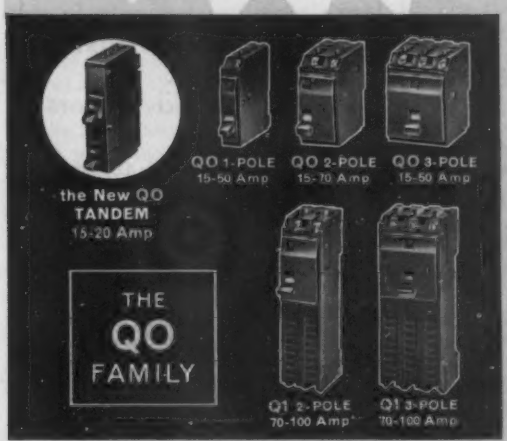
HERE'S THE big NEWS IN CIRCUIT BREAKERS!

Square D's New QO Tandem combines Two Full Size Breakers IN ONE SPACE-SAVING UNIT!

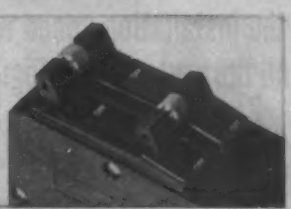
•

Still Maintains ALL the QO Features PLUS these NEW ONES!

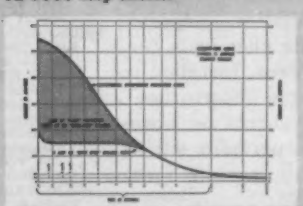
***Why** settle for half-size breakers? With the QO Tandem it's no longer necessary to sacrifice quality to save space and money*



NEW AND EXCLUSIVE *PUSH-IN* CONNECTORS
Fast, positive connections. Holds on 5000 amp shorts.



***DOUBLE* DOUBLE POLES**
Doubles the number of 15 and 20 amp double-pole breakers. Uses QO handle tie.



***QWIK-OPEN* THERMAL-MAGNETIC**
Magnetic opens on first flash. Thermal holds on overloads. No known protection is faster.

SAVES SPACE AND MONEY
More circuits in same space. Lower device cost. Save up to 20%.

***Write** for latest QO Bulletin which tells the complete story of the finest breaker ever built*
Address Square D Company, Mercer Road, Lexington, Kentucky

SQUARE D COMPANY

wherever electricity is distributed and controlled

ATTENTION: Architects, Electrical Engineers, Contractors and Design Consultants

DESIGNERS
ENGINEERS
MANUFACTURERS

THE ULTIMATE
IN LIGHTING
FIXTURES

THE FIXTURE YOU NEED COULD BE IN THE STOCK OR THE IMAGINATION OF STA-BRITE!

If you don't see it, ask for it! This could easily be the slogan of Sta-Brite ... because if the one fixture you need isn't among the tremendous variety we carry in stock as a matter of principal — the chances are good that you've no sooner said it than it's designed ... by Sta-Brite! Specialists in Shopping Center and Retail Store lighting ... as well as all commercial lighting, from Banks to Airports ... we can either fill all your needs from stock, or have our design and engineering department go to work on your more complicated special problems. It is significant that Sta-Brite never stops designing new fixtures ... never stops searching for better lighting at lower cost. Watch for our latest innovation — to be announced next month! And CALL ON US SOON.

Whatever your requirements in lighting homes, offices and factories — depend on STA-BRITE'S quality fixtures and experienced engineering staff.

Write on your company letterhead for Sta-Brite's 1961 Price List.

STA-BRITE
FLUORESCENT MANUFACTURING COMPANY

TERRITORIES AVAILABLE

3550 N.W. 49th STREET • MIAMI 42, FLORIDA

All the installation speed of Flexible Conduit, ...All the protection of Rigid Conduit...with LIQUATITE®

Extruded Polyvinyl Jacket Molded to Galvanized Flexible Conduit

Complete protection against any and all contamination—impervious to water, oils, chemicals, corrosive atmospheres. Installed in minutes. No more "down-time" due to wiring shorts or burnouts, no more periodic wiring replacements.

Write for free sample, costs and name of Distributor nearest you.

Type LT
JIC APPROVED

Type LA
UNDERWRITERS' APPROVED

DISTRICT OF COLUMBIA
Washington
James P. Quick
2514 "K" Street, Room 55
Federal 3-2210
FLORIDA
Miami
Hopper & James
P. O. Box 47456, N.W. Branch
Oxford 6-0611
GEORGIA
Atlanta
Hopper & McCoy
P. O. Box 2527, Station D
Trinity 2-5803
INDIANA
Indianapolis
A. Lee Clifford Company
1801 West 18th Street
Melrose 6-4411
MISSOURI
Kansas City
Parkins & Bretz Company
500 V.F.W. Building
Valentine 1-6011
NORTH CAROLINA
Greensboro
Barber-Ayres & Associates
1705 West Lee Street
Broadway 3-9108
PENNSYLVANIA
Pittsburgh
Crescent Sales Co., Inc.
4830 McKnight Road
Forest 4-3700
TEXAS
Dallas
Burrus and Matthews
2810 Canton Street
Riverside 1-6241
Houston
Burrus and Matthews
1116 Nagle Street
Capital 7-4173
VIRGINIA
Richmond
Lewis J. Crews
1725 Arlington Road
Elgin 3-2272

ELECTRI-FLEX COMPANY
P. O. BOX 128-N — ROSELLE, ILLINOIS

An Electrical South Reader Service

For the convenience of our readers a listing of Manufacturers' Agents serving our advertisers appears in this issue.

Pages 135, 136, 137

Know the law

by Arthur L. H. Street

Lien claim unjustified for personal property

FOR THE PURPOSES of an electrical contractor's mechanic's lien claim, a structure may be regarded as part of the real estate on which it stands, justifying the lien claim as to the owner of the real estate, but it may be regarded as personal property and so not lienable as against one who sold the structure as personal property, under a reservation of title until payment of the purchase price.

That is the gist of the decision rendered by the Florida District Court of Appeal, Third District, in the case of E & E Electric Co., Inc. v. Gold Coast 72nd Street Diner, Inc., and others, 116 So. 2d 660.

The manufacturer of prefabricated diners sold one to the operator of a restaurant on leased premises. The sale contract reserved title in the seller until the purchase price should be paid, specifying that the diner and its equipment should be regarded as personal property.

The buyer of the diner contracted with plaintiff for installation of electrical equipment and wiring. As a part of the installation of the diner on the premises it was necessary to erect a cement block auxiliary building at the rear of the foundation upon which the diner was placed.

This auxiliary building housed a walk-in icebox, the air-conditioning equipment, the electrical control panel, and certain other service features. The lessee did not pay plaintiff for the electrical work and the latter filed a claim of lien and later a suit to foreclose the lien, in which it asked that its lien be declared superior to any claim of the seller of the diner, upon the completed diner.

On an appeal from the decision by a chancellor — trial judge — the District Court of Appeal ruled that the electrical contractor's lien was inferior to that of the seller of the diner, but valid as against the owner-lessor of the real estate. Here are the high spots of that court's opinion:

The appellant owner-lessor of the premises argued that the diner was not personal property. City Trade — seller of the diner — disagreed because the diner was designated as personal property in the conditional sales contract between City Trade and Diner, Inc., and was likewise so designated in the lease between the lessor, Abbott, and the lessee, Diner, Inc.

It is true that the designation in a contract of certain property as personalty rather than realty will ordinarily bind only the parties to the property classification. Here the lienor — the electrical contractor — had acquiesced in the classification. The arrangement between Diner, Inc., and City Trade was that of buyer and seller.

Sales agreement

In order to secure City Trade for the balance of the purchase price the conditional sales agreement was entered into. It affirmatively appears that the lienor knew of this security agreement. Even though the agreement be viewed merely as a device for security, it was effective as notice to the prospective lienor that he must deal with the property subject to the superior lien of City Trade.

The fact that the buyer and the seller chose a cumbersome method of expressing the lien does not render it any less of a lien. The lease agreement, through which the lienor seeks to reach any interest beyond that of the lessee, recognized the lien of City Trade.

Reversing the lower court's ruling that, as between Abbott and the owner of the land leased by him for operation of the diner, the auxiliary building did not constitute such improvement of the real estate as to support a mechanic's lien, the Court of Appeal said:

"Section 84.01, Florida Statutes, defines improve and improvement as follows:

" 'Improve' means build, erect, place, make, alter, remove, repair or demolish any improvement upon, connected with, or beneath the surface of any land, or excavate any land, or furnish materials for any of such purposes, or perform any labor or services upon such improvement; . . . .

(Continued on page 127)

Contractor held liable for electrician's fall

THE PROBLEM: Building construction was let by the owner to one contractor and electrical installations to another. While working on a scaffold furnished by the building contractor an employee of the electrical contractor was fatally injured when he fell from the scaffold, which did not have safety guard rails required by state statute.

The injured man's widow sued the building contractor for damages, and the trial judge awarded judgment in her favor in accordance with the verdict of a jury. Except for the fact that the trial judge erred in instructing the jury concerning the liability of the building contractor, was the widow entitled to judgment?

COURT'S ANSWER: Yes. So decided the California Supreme Court in ordering a new trial in the case of Hall v. Paul Bunyan Lumber Co., and L. J. Anderson, 2 Cal. Rptr. 519. Here is the gist of the points decided by the Supreme Court:

The general contractor having agreed in his contract with the owner to erect and maintain scaffolds to be used by both contractors, was bound to follow state law requiring guard rails.

The evidence did not conclusively show that the accident was due to the electrician's own fault as distinguished from the fault of the general contractor.

New trial ordered

But a new trial was ordered because the trial judge told the jury that the general contractor could excuse neglect to provide handrails on the scaffold only by showing that the failure was due to causes beyond his control. This was erroneous because it disregarded evidence offered by the general contractor tending to show that he reasonably understood that the scaffold would not be used by the electrical contractor other than for the raising of materials and that the electrical contractor's men would not work on the scaffold.

News of the industry

edited for Southern readers

Atlanta group to hold street lighting meeting

A ONE-DAY CONFERENCE on street lighting will be held in Atlanta on April 19.

Sponsored by the Atlanta Electrical League, the conference will be held in the Architects and Engineers Institute Building, 230 Spring St., N. W.

The meeting will not be technical, but will be aimed at emphasizing the user benefits of street lighting. Tentatively, papers will be presented on traffic safety, business improvement, the crime rate, general community benefits, and "What is Good Street Lighting?"

Speakers will be Art Jaeger, street lighting specialist, Corning Glass Works, Corning N. Y.; C. J. Meloun, manager of marketing, General Electric Outdoor Lighting Div., Hendersonville, N. C.; and W. H. Edman, vice-president for street lighting, Holophane Co., Newark, Ohio. Several additional nationally prominent people in the street lighting field will also participate in the program, including R. S. Buckner, Philadelphia Electric and Manufacturing Co.

Arrangements for the meeting are being coordinated by Charles R. Minors, of Georgia Power Co., chairman of the league's lighting committee.

W. Chase nominated as AIEE's president

THE NOMINATION of Warren H. Chase, Cleveland, to be 1961-62 president of the American Institute of Electrical Engineers, and the nomination of ten vice-presidents and four directors were announced at the recent Winter General Meeting of AIEE in New York's Hotel Statler-Hilton.

The election will take place by mail ballot among the institute's more than 55,000 members, and results will be announced at the Summer General Meeting at Ithaca, N. Y., in June.

Mr. Chase is vice-president of the Ohio Bell Telephone Co., with which he was first associated in 1919. His service with the company has been continuous since 1925. Mr. Chase received a BS degree from the Harvard University School of Engineering. Previously he had attended Case Institute of Technology, Cleveland.

District vice-presidents nominated were Thomas E. Marburger, assistant general superintendent, Baltimore Gas & Electric Co.; Benjamin V. Martin, headquarters representative, Westinghouse Electric Corp., Charlotte, N. C.; Warren B. Boast, head of the Electrical Engineering Dept., Iowa State University, Ames, Ia.; Charles R. Day, superintendent of electrical engineering, Sacramento Municipal Utility; J. Prescott Skillen, Hamilton, Ont.; Leslie J. Weed, head of the Electrical Engineering Dept., Boston Edison Co.; and Alva A. Johnson, engineering manager, Switchgear Div., Westinghouse Electric Corp., East Pittsburgh, Pa.

Nominated to be technical vice-presidents were Charles E. Dean (Communications Div.) radio engineer and editor, Hazeltine Research Corp., Little Neck, N. Y.; Lee R. Larson (General Applications Div.) staff engineer, the Martin Company, Denver, Colo.; and J. H. Kinghorn (Power Div.) deputy electrical engineer, American Electric Power Service Corp., New York, N. Y.

'Competition' sums up problems of industry

THE MAJOR PROBLEMS OF the electrical equipment industry, the *Value Line Investment Survey* states, boil down principally to one word — competition.

Prices have been under pressure in virtually all segments of the industry. Excess capacity is seeking orders. Meanwhile, competition from foreign goods increases. Profit margins have crumbled.

This explains the determined stand taken by General Electric and Westinghouse in the recent wage negotiations which resulted in a modest settlement.

With a probable deepening in the current recession next year, this great growth industry's problems will be intensified, the survey notes. Competition, now tougher than at any time in the past decade, will become keener. Government business will be expanding, but it will do more for sales than for profits. Capital spending seems likely to slip, dampening orders for heavy goods, while sales of consumer durables are not expected to exceed this year's disappointing level. In 1961, the survey looks for total electrical equipment industry profits to be only nominally above the 1960 level.

Over the next three to five years, the survey sees mounting competition still a major problem. Therefore, while the growth in the physical output of the electrical equipment industry is expected to continue to outpace the FRB Index by a wide margin, the survey looks for a product price level no higher than the current one.

I-T-E divides company into new market areas

APPOINTMENT of George R. Hoffman to the position of Southern area manager has been announced by I-T-E Circuit Breaker Co.

Mr. Hoffman's appointment is one of seven just made by the company in line with a division of the country into seven marketing areas—replacing the former four larger sales regions.

George R. Hoffman

The change was made to provide improved customer service throughout the country in all markets in which I-T-E is associated.

Mr. Hoffman joined I-T-E in 1947 as an application engineer in the Switchgear Div. In 1954 he was appointed Southern regional manager under the previous marketing setup.

The new Southern offices will be located in Atlanta.

NC State to conduct wood pole conference

THE WOOD PRODUCTS Dept., North Carolina School of Forestry, is sponsor of the "South Atlantic Wood Pole Conference" at Raleigh, April 5 and 6.

The conference will be held in the student union on the campus of North Carolina State College.

A comprehensive program of basic technology and current information

on the production, deterioration, preservative treatment, purchasing, inspection, and maintenance of wood utility poles will be presented.

Technical papers which will also be pre-printed and bound will be presented by industrial, educational, and governmental specialists and researchers.

Management and technical personnel in operating utilities and other users of treated wood products, as well as manufacturers of treated wood products—those who want information on which to make and carry out sound economic operating decisions—will find the conference of particular value.

The conference is open to all interested persons, and those wishing to attend may obtain copies of the conference program and advance registration by writing to the Wood Products Extension Section, 266 Kilgore Hall, North Carolina State College, Raleigh, N. C.

Housepower Panel Plan enlarged by Duke Power

DUKE POWER has expanded its cost-saving Housepower Panel Plan to include residential customers requiring up to 400-amp service entrances.

The extension was made possible because the larger size panels are now available from manufacturers.

The Housepower Panel Plan, introduced last May, helps Duke Power's builders and residential customers who construct or modernize for total-electric living. Each person qualifying receives a complete housepower entrance, consisting of a housepower riser and a housepower panel with circuit breakers. This panel was previously available in sizes up to 200 amperes. Now that it is manufactured in the larger size, Duke Power is including it in the plan.

A total of 1,796 residential customers benefited from the plan from May 1 through December. They qualified by meeting the requirements of Duke Power's lower all-electric rate. This economy rate is based on the use of electricity for all space heating, water heating, and other usual purposes in homes that are properly insulated to assure maximum comfort.

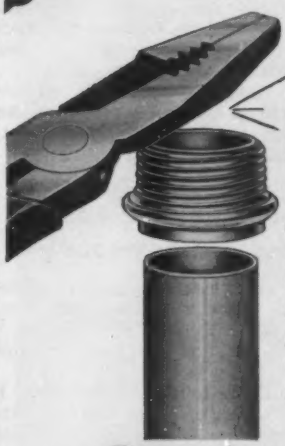
Westinghouse to supply big Florida development

WESTINGHOUSE ELECTRIC Corporation has been awarded a contract to supply electric appliances, electric heating and air conditioning units, and related home equipment for a $100 million home development project now underway in Bradenton, Fla.

According to William H. Loeber, manager, Westinghouse residential marketing department, the Westing-

a twist

A twist is all it takes to install Tomic's new 90° Flexible Steel Conduit Connectors. No screws, no clamps, no bolts required! Hinged snap-cap provides easy accessibility for fast wiring inspection. Available in straight type also.



a tap...

Just tap, or push it on—and presto! Tomic's famous Tap-On Connectors and Couplings become an integral part of the thinwall conduit! Provide vibration-proof, positive grounds—won't shake, jar or work loose.

or a snap

It's a snap to secure raceways with Tomic's Speedi No-Bolt Pipe Clamp. Automatically adjusts to ½" and ¾" EMT, rigid and flexible steel conduits. Snaps tightly, securely without nuts, bolts or tools!

... is all it takes to install *Any* tomic fitting!

ALL Tomic Electrical Products are developed with the contractor in mind—under Tomic's extensive program of research, specialized engineering, and nation-wide field testing. Patented by Tomic, these products are specifically designed to give you faster, easier, *better* electrical installations *at lower cost.*

AVAILABLE THROUGH WHOLESALERS ONLY.

Please send Bulletin C-10 on Tomic's full line of electrical fittings.

NAME_____

ADDRESS_____

CITY_____ ZONE____ STATE____

Name of my wholesaler_____

tomic SALES & ENGINEERING CO.

20000 Sherwood Avenue, Detroit 34, Michigan

TODAY'S FINEST ELECTRICAL FITTINGS

house portion of the project could be approximately $3,750,000, depending on the total number of houses to be built.

Located between Bradenton and Sarasota, the residential area will be the largest total electric community in Florida, according to Irving Rubin, president of Windsor Park Estates, Inc., the developer. Immediate plans call for some 1,600 homes to be built within the next two years, although it is expected a total of 8,000 homes eventually will be completed.

Included in the homes, priced at $9,290, will be ranges, water heaters, wall heaters, Micarta counter tops, and Bryant wiring devices. Refrigerators may be purchased as optional equipment. Mr. Loeber said appliances for homes in the $12,000 to $16,000 bracket will include heat pumps, built-in ovens and platform units, water heaters, dishwashers, and waste disposers. Refrigerators and laundry equipment are optional.

Mr. Loeber explained that the Windsor Park project "is an example of the ability of one manufacturer to offer the builder a complete line of products—reducing the developer's administrative costs and the ultimate cost to the customer."

Kentucky IAEI chapter has mid-year convention

THE KENTUCKY CHAPTER, Western Section, IAEI, held their mid-year convention, in cooperation with affiliated electrical contractors, January 19-20, in Louisville.

Features of the meeting included a report on new materials and wiring methods by Walter D. Roach, E. J. Theobald, Jr., and Robert Hefferman; a discussion of low voltage circuit breaker service entrance equipment by Kent P. Stiner, engineering coordinator, Bulldog Electric Products, Co.; and an adequate wiring report from Ollie W. Windhorst and Frank Stein.

Other main points of interest included a talk on loading three-phase, four-wire systems by Harry T. Smith, director of engineering and purchasing, Kentucky Rural Electric Cooperative Corp.; and an address on the new conception of lighting by Val McClusky, district engineer, Large Lamp Div., General Electric Co.

Gold Medallion builders honored at convention

BUILDERS OF ELECTRICALLY heated Gold Medallion Homes, who bucked last year's nationwide slowdown in new home starts and ran 30 per cent ahead of 1959, were recently honored at the NAHB Convention by the electric industry's Live Better Electrically Program.

Over 4,000 builders who have already profited by building Gold Medallion Homes were listed by name and state in the LBE display announcing this year's coordinated, $52 million advertising push by utilities and electrical manufacturers.

The electric utilities will spend $30 million in their local service areas and $2½ million in the national Live Better Electrically Program to help builders sell homes with electric living benefits. Manufacturers of electric appliances and heating equipment will back this up with $20 million in television and print advertising.

The LBE display also shows the soaring consumer demand for electrically heated homes since 1950 and during the coming decade.

In the United States there are now 850,000 homes with electric heat. An estimated 4,000,000 electrically heated homes will be built by 1970.

Regional meeting held by Pass and Seymour

TWENTY-ONE executives and salesmen for Pass and Seymour, Inc., Syracuse, N. Y., met recently for a regional conference in New Orleans, La.

In addition to the home office, P and S's Chicago, South Central, Atlanta, and Carolina sales territories were represented at the meeting, held at the Sheraton-Charles Hotel.

James S. Pass, company president, headed the group from Syracuse, which included Robert M. Salisbury, executive vice-president; David J. McCarty, general sales manager; Ted Mager, field sales manager, and Keith Shaeffer, sales training supervisor. Mr. Mager was chairman of the two-day parley.

LP&L executives give prediction on economy

BUSINESS IN LOUISIANA probably will be slow for the remainder of this first half of 1961, but should be followed by an upturn about the middle of the year.

This general economic forecast was voiced by W. O. Turner, chairman of the board and chief executive officer of Louisiana Power & Light Co., and G. C. Rawls, president. They were among the speakers who addressed LP&L's supervisory employees at the company's recent annual meeting in East Jefferson.

A highlight of the meeting was the announcement that LP&L has "hired a new employee"—Reddy Kilowatt, who will assist the company in sales, accounting, and other fields. Ash Collins, Sr., creator, was present to explain how Reddy can be used to assist customers and to tell the story of electric service.

Robert Cunningham, a member of the Edison Electric Institute's staff in New York, briefed the employees on proposed "Live Better Electrically" promotional activities in 1961.

Other speakers on the program included E. A. Rodrigue, vice-president; W. T. Hess, vice-president and chief engineer; J. H. Erwin, Jr., assistant secretary and assistant treasurer; H. L. Deloney, assistant chief engineer; R. C. Paslay, commercial sales manager; O. K. LeBlanc, sales promotion and advertising manager; and J. F. Bautsch, Jr., manager of the Southeastern Div.

Southwestern names Watson as president

H. L. NICHOLS was recently elected chairman of the board of the Southwestern Public Service Co., Amarillo, Texas, at the company's annual organizational board meeting.

J. E. Cunningham was elected vice-chairman of the board. A. R. Watson was chosen president and general manager, and Don D. Loden was elected vice-president and secretary.

Other vice-presidents named were H. O. Hodson, Roy Tolk, and W. L. Pearson. J. T. Bradley was named treasurer and assistant secretary.

Mr. Watson was promoted from the position of executive vice-president and general manager. Mr. Cunningham was promoted from the position of president.

A. R. Watson

Electrical distributors to convene in Detroit

THE 53RD ANNUAL convention of the National Association of Electrical Distributors will be held in Cobo Hall, Detroit, April 30-May 3.

Joint headquarters hotels for the event are the Sheraton-Cadillac and the Statler Hilton.

B. Weingarten opens new Baltimore office

B. WEINGARTEN has announced the opening of a new headquarters office at 5445 Fairlawn Ave., Baltimore 15.

Mr. Weingarten represents the Kinney Electrical Manufacturing Co., Elgin, Ill., in Maryland, the District of Columbia, and adjacent Virginia counties.

Kinney manufactures lighting panels, power distribution panels, switchboards, unit substations, and other related equipment.

E. Dawes to represent Advance Transformer

EDGAR E. DAWES & Company is handling distributor sales for Advance Transformer Co., in Alabama, Florida, Georgia, and Tennessee.

The company has a sales organization of eight field men, and headquarters are in the Rhodes Building, Atlanta 3, Ga.

Mississippi IAEI group schedules Code meeting

JACKSON'S HEIDELBERG Hotel will be host for the 22nd annual Code meeting of the Mississippi Chapter, IAEI, March 27 and 28.

Moderator will be B. Z. Segall. Arrangements have been made with a number of electrical equipment manufacturers to display their merchandise and give engineering information in booths.

Members and interested persons in Alabama, Louisiana, and Tennessee are welcome to attend, according to C. B. Grauer, secretary.

Brief news notes of manufacturers

JUST ANNOUNCED is the appointment of Richard L. Jones as a new Virden representative in the Houston, Texas, area.

In his new capacity Mr. Jones will handle both the Virden Lighting residential fixture lines and the Lighting Dynamics commercial, industrial, and institutional fluorescent and incandescent lighting equipment.

For the past five years he has worked directly in the electrical industry with contractors, wholesalers, and as a field sales engineer with another lighting fixture manufacturer. In his new assignment he will work under the supervision of regional sales manager Jack Raley.

* * *

CHELSEA FAN and Blower Co., Inc., Plainfield, N. J., announces the appointment of three new sales representatives in the South.

Jim Hash and Co., 109 W. Jackson Ave., Knoxville, Tenn., has been named to handle operations in the central and eastern parts of Tennessee. I. Arnold Hoge Associates, 489 Overbrook Dr., N. W., Atlanta 18, Ga., has received an appointment to cov-

ROYAL Portable Cords

Open a carton of Royal portable cord and you *know* you're getting the easiest handling, fastest working cord available anywhere. Flex it, crimp it, strip it . . . and you can see why Royal cord meets *all* your job requirements for flexibility, safety, and durability. Royal's reputation for quality and dependability rate Royal Cords *first* among electrical men from coast to coast. Your wholesaler has a complete range of cord types and sizes — rubber, neoprene, plastic jackets — fixture wires, lamp cords — thermo cables, coaxial cables, bell and machine tool wires, and more. They're made right, packaged right, priced right—start to use them today!

ROYAL ELECTRIC ...an associate of UCC

ROYAL ELECTRIC CORPORATION
PAWTUCKET, RHODE ISLAND
In Canada:
Royal Electric Company (Quebec) Ltd., Pointe Claire, Quebec

REPRESENTATIVES:
Cory Chapman & Co., Atlanta—New Orleans—Greensboro—Birmingham
Suchman Associates, Inc., Miami
NuRo Company, Houston—Dallas—San Antonio

er Georgia, Alabama, and the northwestern portion of Florida. Named to serve in the general Florida area is John R. Collins and Associates, 1708 North "A" St., Tampa 6, Fla.

The company has also changed the location of their Atlanta warehouse stock to Bonded Service Warehouse, 225 Moore St., Atlanta.

The announcements were made by A. E. Ott, general sales manager for Chelsea.

CONSTRUCTION has begun in Lincoln, R. I., on a new 400,000 square foot, single story plant for Collyer Insulated Wire Co., Pawtucket.

The new plant will consolidate operations now being carried on at four separate locations in Pawtucket and Central Falls, R. I., and is expected to be ready for occupancy early in 1962.

The new plant is expected to reduce materials handling costs.

Dates ahead

IAEI, Mississippi Chapter, Heidelberg Hotel, Jackson, Miss., March 27-28, 1961.

Southeastern Electric Exchange, Annual Conference, Boca Raton Hotel & Club, Boca Raton, Fla., March 27-29, 1961.

AIEE South East District Meeting, Jung Hotel, New Orleans, La., April 5-7, 1961.

IAEI, Georgia Chapter, Forrest Hotel, Rome, Ga., April 10-11, 1961.

IAEI, Ellis Cannady Chapter, Carolina Hotel, Raleigh, N. C., April 12-13, 1961.

Missouri Valley Electric Assn., Engineering Conference, President Hotel and Municipal Auditorium, Kansas City, Mo., April 12-14, 1961.

Southeastern Electric Exchange, Engineering & Operation Section, Hollywood Beach Hotel, Hollywood, Fla., April 12-15, 1961.

IES Southwestern Regional Conference, Skirvin Hotel, Oklahoma City, Okla., April 16-18, 1961.

IAEI, Alabama Chapter, Tutwiler Hotel, Birmingham, Ala., April 17-18, 1961.

Fourteenth Annual Conference for Protective Relay Engineers, Agricultural and Mechanical College of Texas, College Station, Texas, April 17-19, 1961.

Alabama Electrical and Electronics Exposition, Second Annual Exposition, Birmingham City Auditorium Convention Hall, Birmingham, Ala., April 17-19, 1961.

IES Southeastern Regional Conference, Atlanta Biltmore Hotel, Atlanta, Ga., April 19-21, 1961.

IAEI, South Carolina Chapter, Cabana Inn, Spartanburg, S. C., April 20-21, 1961.

IAEI Five - Chapter Joint Meeting—Baton Rouge, George Welman, North Louisiana-East Texas, Texas, and Texas Gulf Coast Chapters—Windsor Hotel, Abilene, Tex., April 28-29, 1961.

National Assn. of Electrical Distributors, Annual Convention, Detroit, Mich., April 29-May 3, 1961.

Protective Relaying Conference, Georgia Tech, Architecture Auditorium, May 4-5, 1961.

IAEI, Florida Chapter, Casa Marina Hotel, Key West, Fla., May 5-6, 1961.

IAEI, Executive Council, Statler Hotel, Detroit, Mich., May 14-19, 1961.

IAEI, Virginia Chapter, Hotel Roanoke, Roanoke, Va., June 12-13, 1961.

AIEE Summer General Meeting, Cornell University, Ithaca, N. Y., June 18-23, 1961.

IES National Technical Conference, Chase Park Plaza Hotel, St. Louis, Mo., Sept. 24-29, 1961.

National Electrical Contractors Assn., Washington, D. C., week of October 9, 1961.

AIEE Fall General Meeting, Statler-Hilton Hotel, Detroit, Mich., Oct. 15-20, 1961.

IAEI, Southern Section, Grove Park Inn, Asheville, N. C., Oct. 16-18, 1961.

M&W ELECTRIC Manufacturing Co., Inc., P. O. Box 87, E. Palestine, Ohio, has appointed Ray Williamson and Associates of Gadsden, Ala., as representative for the northwest section of Florida.

• • •

COLUMBIA CABLE and Electric Corp., Brooklyn, N. Y., recently announced the appointment of two new manufacturers' representatives.

Peabody Brothers of Dallas, Texas, is representative for Texas, north of a line drawn east and west through San Angelo and including San Angelo and Oklahoma.

Lusty-Thomson Co., Cleveland, Ohio, is their representative for Ohio, north of a line drawn east and west directly north of Columbus, to include Marietta, Zanesville, and Lancaster.

• • •

JOHNS-MANVILLE Corporation started transferring headquarters of its expanding Dutch Brand Division from Chicago to New York recently to facilitate introduction of a whole line of new products and integration of another plant. The move is expected to be completed in the next two or three months.

The Johns-Manville plant at Tilton, N. H., which produces an extensive line of asbestos papers, electrical insulations, and asbestos sheet insulation, is now a Dutch Brand Division facility, according to E. H. Wells, vice-president and division general manager. This plant was formerly operated by the J-M industrial Insulations Div.

The Dutch Brand Division is one of ten operating divisions which comprise the manufacturing and distributing arms of Johns-Manville Corp.

• • •

WALTER NASH has been appointed Southern representative for Bell Electric Co., Chicago, in Georgia, Alabama, and eastern Tennessee, according to H. L. Stillman, Bell president.

• • •

SQUARE D COMPANY has purchased from Gorham Manufacturing Company a 98,000-square foot plant located on 35 acres on the outskirts of Asheville, N. C., Lawrence G. Maechtlen, Square D president, announced. Purchase price was not disclosed.

The plant is expected to employ 200 to 300 workers and will serve as headquarters for Square D's Commercial Control Div.

• • •

TRI-STATES Sales Company has been appointed as manufacturer's representative in Oklahoma by the Kirlin Co., Detroit, according to Paul D. Cornelisen, sales manager for Kirlin.

News about people

Philip H. Light has been named manager—electric utility analytical engineering for General Electric's electric utility engineering operation, it was announced recently by **James**

Philip H. Light

F. Young, general manager of operations.

Mr. Light graduated from Iowa State University in 1935 and joined General Electric on the engineering test program.

William E. Wilton has been elected executive vice-president of Jasper Blackburn Corp., St. Louis, by the

William E. Wilton

firm's board of directors, according to **R. N. Leach,** Blackburn president.

Mr. Wilton was formerly vice-president in charge of engineering and manufacturing. He joined the company in 1938.

J. Wesley Lewis was named manager of Duke Power Company's Durham district recently, succeeding **Earl C. Dameron,** who is retiring.

Mr. Lewis joined Duke Power in 1937 as a lighting engineer. He was named assistant manager in Durham in 1959. He is a graduate of Clemson.

Mr. Dameron joined Duke Power in 1914 in its meter department. He subsequently served as meter super-

"How fast can it be delivered?"
"It's available immediately...from your wholesaler's inventory and Killark warehouse stocks in 18 cities!"

* KILLARK XALB-6 EXPLOSION-PROOF PULLING ELBOW... Copper-free aluminum casting, permanently rust-proof and corrosion-resistant, non-magnetic and non-sparking. Split design provides easy access to wiring; ribbed for greater strength. U.L. and C.S.A. approved. Carried in stock for fast delivery, a typical example of Killark's ability to supply all your needs —large and small—for both hazardous and non-hazardous installations.

Killark distributors can usually deliver all electrical fittings and fixture requirements from inventory. If not, your needs from the more than 7,500 items in the Killark line can be obtained *at once* from a convenient Killark warehouse. There are eighteen of these dependable supply sources located throughout the United States and Canada.

Write for the Killark catalogs.

Killark ELECTRIC MANUFACTURING COMPANY

Vandeventer and Easton Aves. • St. Louis 13, Mo.

In Canada: Killark Electric of Canada, Ltd., 421 Islington Ave. South, Toronto 18, Ont.

intendent, district superintendent, electric department superintendent, and assistant manager before his appointment as manager in 1952.

Edward J. O'Connor, engineer in the system distribution engineering department of the Florida Power Corp., has been named supervisor of his department. He replaces **L. H. Scott,** who was recently promoted to St. Petersburg division engineer.

A graduate of St. Petersburg Junior College and the University of Florida, Mr. O'Connor was employed by the Florida Power Corporation in 1949 as a junior engineer.

Directors of Southwestern Electric Service Co., Dallas, Texas, electric utility serving customers in Central and East Texas, elevated two department heads to the executive staff at a recent board meeting, it was announced by **John T. Shewmake,** president.

Charles D. Goforth, who joined the company in 1947 and has been general sales manager since 1959, was elected a vice-president, and will be

Charles D. Goforth

in charge of sales and industrial development. He attended Kilgore Junior College and Rice Institute in Texas.

E. W. LeNeveu, manager of advertising and publicity and assistant in the executive offices, who has been with the company since 1934, was elected secretary. He is a graduate of Amarillo College.

Five new vice-presidents were recently named for the Carolina Power and Light Co.

Those chosen include **A. J. Skaale,** manager of the operating and engineering department; **H. G. Isley,** general sales manager; **D. E. Stewart,** manager of the area development department; **Shearon Harris,** associate general counsel; and **E. N. Pope,** director of advertising and sales promotion.

Mr. Skaale has been with the company since 1930, and has held positions of operating engineer, superintendent of power, and his present position as manager of operating and engineering.

Mr. Isley is a graduate of Trinity College (now Duke University), and has been with the company since 1919. He served as residential and commercial sales manager before being named to his present position.

Mr. Harris, a graduate of Wake Forest College, with both a B.A. and an LL.B. degree, has been with the company since 1957.

Mr. Pope, who has been with the company since 1923, is also a graduate of Wake Forest. He served as residential sales manager before assuming his present post.

Mr. Stewart received his bachelor's degree from North Carolina State College, and joined the company in 1925. He became associated with area development in 1943, and in 1957 became manager.

Appointment of a vice-president and the retirement of the company's executive vice-president were announced recently by G&W Electric Specialty Co., Blue Island, Ill.

Norman O. Kirkby was appointed vice-president, and will serve as general manager.

W. F. Young has retired as executive vice-president, but will remain in an advisory capacity to the company.

South Carolina Electric and Gas Company has named a new vice-president and has appointed another vice-president to its executive committee, **S. C. McMeekin,** president, announced recently.

C. M. Oyer, treasurer and a veteran of 39 years in the utility business, has been named vice-president and treasurer. He was also appointed as director of the firm, and will assume the post formerly held by the late executive vice-president, **J. M. Costello.**

W. Judson Ready, vice-president and controller, was appointed to the company's three-man executive committee, succeeding Mr. Costello in this capacity.

J. F. Pennington, Sr., vice-president and general manager of Georgia Power Co., has been elected a member of the company's board of directors, **John J. McDonough,** president, announced recently.

C. B. McManus, recently retired board chairman of the Southern Co., and former Georgia Power president, was elected an honorary director.

The appointment of two persons to new management positions has been announced by **M. O. Hollis,** executive vice-president, Raybro Electric Supplies, Inc., Tampa, Fla.

Gerald Edwin Plocar has been named statewide manager of the company's lighting and electric heat sales. Prior to his new appointment, he served in the general sales department of the central office. Mr. Plocar holds a degree in traffic management from the Chicago College of Advanced Traffic. He has been with the company since 1955.

Dennis F. Fisher has been manager of utility sales for the company's Miami branch operation. Mr. Fisher has served with the Miami sales staff since 1958. He is a graduate of the University of Florida, and has been with Raybro since 1951.

John V. McGuire has been appointed general manager of Allis-Chalmers Pittsburgh Works.

He succeeds **D. A. Griffith,** who had served in the post since 1954 and asked to be relieved.

Mr. McGuire joined Allis-Chalmers in 1940 after obtaining his electrical engineering degree from Lehigh University. He became assistant general manager of Pittsburgh Works in 1958.

He is past chairman of the power circuit breaker group of the National Electrical Manufacturers Association's switchgear section.

Mr. Griffith has been with Allis-Chalmers since 1927. He became assistant to the general manager of Pittsburgh Works in 1947. In 1952, he became assistant manager of Allis-Chalmers' Washington, D. C., office in charge of federal controls and regulations.

He was recalled to the Pittsburgh Works in 1953 as assistant general manager and the following year was promoted to general manager.

Roy A. Palmer, illuminating engineer of Duke Power Co., received the Distinguished Service Award recently from the Charlotte Engineers Club, Charlotte, N. C. The presentation was made at the club's annual banquet.

Mr. Palmer was cited as "Lighting pioneer, Fellow of the Illuminating Engineering Society, by virtue of achievement in advancing the profession of engineering and unusual service to this club and to the community at large; talented servant of civic and professional associations, education, and the arts."

Edwin Vennard, executive director of the Edison Electric Institute, was principal speaker at the banquet.

Line Material Industries announces the recent promotion of **H. R. Rowe** to the newly created position of product manager of protective equipment and capacitors.

Simultaneously, **R. H. Draeger** was named supervisor of capacitor sales and service for the company.

Mr. Rowe was manager of capacitor sales and service prior to his new appointment. Before that, he was an

L-M field engineer. He is an electrical engineering graduate of the University of Arkansas.

Mr. Draeger, who served as an application engineer in the capacitor section until his recent promotion, originally joined the company as a distribution engineer. He is a graduate of the University of Wisconsin.

The Arkansas Power and Light Company recently named **W. Mills Murphey** to the position of manager of the company's corporate service department.

Succeeding Mr. Murphy is **Everett G. Oates,** who has been promoted to executive assistant in the general office of the company. He will serve as assistant to **Robert E. Ritchie,** chairman of the board of directors, and **Paul O. Canaday,** president of the company.

Mr. Oates has been with the company for 12 years.

Frank P. Goodwin has been elected president of the Interstate Electric Co., New Orleans, La., it was announced recently by the company.

Mr. Goodwin was formerly vice-president of Interstate and general manager of Intrasouth Distributing, the company's division in Shreveport, La.

Frank P. Goodwin

Gulf States Utilities Company has announced that **Victor P. Gayle,** formerly system sales promotion director, has been promoted to system residential sales superintendent.

Succeeding Mr. Gayle is **Joseph E. DeJean,** former supervisor of advertising, who advances to system supervisor for residential sales promotion.

The promotions were announced with the retirement of **F. Parker Allen,** system residential sales manager.

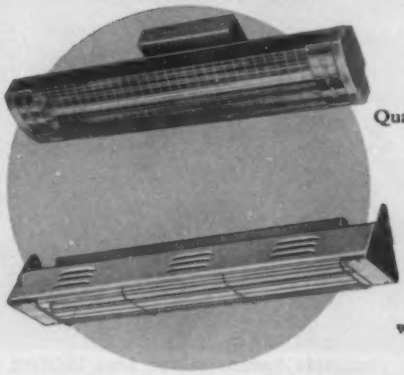
Mr. Gayle worked part time with Gulf States in 1923 while attending Texas A&M College. Shortly after graduating with a BS degree from that school, he joined GSU. He was promoted to system sales promotion director in 1950.

®Electromode

COMPLETE LINE OF

FLAMELESS ELECTRIC HEAT

FOR EVERY HEATING NEED!



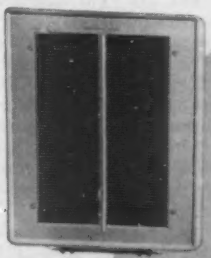
residential

Gentle, sunlike warmth is radiated by the Electromode Residential Quartzone Heater, making this model ideal for bathrooms, porches and small spot heating in large unheated areas.

commercial

The Electromode Quartzone Heater (*illustrated left*) has great utility in industry for keeping people warm in exposed areas, such as loading docks, warehouses, etc. Also ideal for the home patio and swimming pool.

Electromode Quartzone Heaters warm people and objects, not the air. The Quartzone tubing, which is an efficient transmitter of infrared rays, withstands sudden temperature changes, and will not crack if splashed with water.



wall model down-flo heaters

Recommended for complete or supplementary heating of big rooms, offices, entrances, etc. Heat is fan-circulated, clean and odorless. Electromode exclusive Safety Grid heating element assures positive protection from fire, shock or burn. Recessed and Surface Mounted models.

portable-suspension type

Especially useful for supplying extra heat in widely separated areas. May be plugged in temporarily or suspended from swivel-type brackets. Adjustable louvers permit directing fan-forced warmed air where desired. Has Electromode exclusive Safety Grid heating element.

ELECTROMODE
LOW-LEVEL BASEBOARD HEATERS

Here is the modern way to heat home, office or institution. Slim units fit snugly to wall. Customized fittings permit uniform installation, conforming to room design and dimensions.

For full details on complete Electromode Line, write: Dept. ES-61

Electromode division of Commercial Controls Corporation

570 CULVER ROAD, ROCHESTER 3, NEW YORK

Mr. DeJean joined Gulf States in 1949 as assistant advertising director. He became supervisor of advertising in 1956. He is a graduate of Louisiana State University, with a BA degree in journalism.

Mr. Allen began his utility career in 1918, and joined Gulf States in 1926 in Beaumont, Texas. He was promoted to residential sales manager in 1946.

The Hunter Division of Robbins and Myers, Inc., Memphis, Tenn., has named **Parker T. Finch** vice-president and general manager.

Formerly general sales manager of both the Hunter and Trade-Wind Divisions of the company, Mr. Finch succeeds **Frank S. Brady**, who becomes vice-president for special assignments in all divisions.

A. W. McGregor, president of the company, made the announcement.

The promotion of **Ralph D. Pyle** to the position of chief electrical engineer of Copperweld Steel Company's Wire and Cable Division has been announced by **George Hamburger**, manager of sales for the division. Mr. Pyle's headquarters will be at Glassport, Pa.

A graduate of Carnegie Institute of Technology in 1931, Mr. Pyle worked as a civilian employee for the U. S. Corps of Engineers in the Pittsburgh

Ralph D. Pyle

and Philadelphia districts until he joined Copperweld's engineering department in 1937. His work included supervision of the vibration laboratory for the study of electrical conductor performance.

General Electric Capacitor Dept., Hudson Falls, N. Y., has appointed **Donald J. Harrington** manager of marketing, according to department general manager **O. H. Winn.**

Mr. Harrington returns to his former department after five years as manager of marketing at the company's Appliance Control Dept., Morrison, Ill. Earlier Capacitor Department positions included manager of specialty sales from 1952 to 1955.

New products

Revere multiple luminaire

The new Revere Quad-Oval, made by Revere Electric Manufacturing Co., 7420 Lehigh Ave., Chicago 48, Ill., is an efficient, yet inexpensive,

multiple luminaire for area lighting of parking lots and malls.

Its reflector and glassware combination provides high-intensity, glare-free illumination with the maximum utilization of light. Its light distribution pattern approximates a square. Two models are offered.

The No. 5452 Quad-Oval is furnished with four Revere No. 2284 Endovals, using 400-watt mercury lamps. Each luminaire is composed of a die-cast aluminum housing and an Alzak polished reflector in combination with a Revere-Corning prismatic pressed crystal refractor.

The No. 5453 Quad-Oval is furnished with four Revere No. 2502-B250 Urbanovals that will accommodate a 100-,175-, or 250-watt mercury lamp. Each luminaire has an aluminum die-cast fitter attached to a specular Alzak aluminum reflector and a heat resistant Revere-Corning Pyrex molded prismatic refractor.

Write P-314 on reply card, pg. 17

Thomas recessed fixture

A new, pre-wired, recessed lighting fixture, engineered so that installation at the job site can be speeded up, has been introduced by the Star Light Div., Thomas Industries, Inc., 207 E. Broadway, Louisville 2, Ky.

The Star Light X-Press housing and full aluminum reflector, socket, and junction box are completely pre-assembled, eliminating on-the-job assembly. The fixture is pre-wired for quick, easy connection.

Among installation advantages is the use of a bar type hanger which is studded with spikes, eliminating the need of nails or screws. A calibrated, steel spring lock also provides visual adjustment of the support brackets from 1/4 to one inch, according to the thickness of the ceiling.

Wiring connections are made in an extra large outlet box which features pry-out knock-outs on all sides for either 1/2- or 3/4-inch conduits of the type found in rigid, flexible, or thin wall construction.

Write P-315 on reply card, pg. 17

G-E three-way lamp control

Most ordinary single-filament lamp bulbs produce two levels of lighting when operated by General Electric's "High/Low" control, manufactured by the company's Wiring Device Dept., Providence 7, R. I.

This three-position switch operates lamps at full brightness in the high position and at 30 per cent brightness in the low position. Off position is in the center so that either high or low may be switched on directly.

The switch is insensitive to loads and, on one line, will control several incandescent lamps of the same or different wattages within a 300-watt

maximum limit. In the low position, it utilizes a silicon rectifier to reduce power and lower light output. A 40 per cent savings on power consumption can be realized by operating the lamps on low, while increasing lamp life up to 20 times.

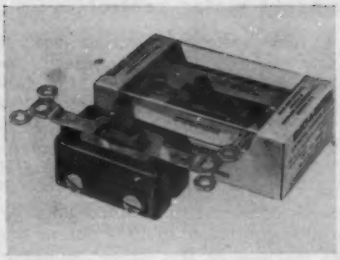
The control is a single pole switch that fits standard switch boxes and requires no special wiring. It may be installed in new wiring or used to replace single pole switches in existing wiring.

Write P-316 on reply card, pg. 17

Solar Sonic dimmer switch

Light dimming switches are becoming popular for all-around household use, and Solar Sonic Devices, Inc., Hicksville, N. Y., recently introduced their own low cost version, the Select-A-Switch.

The device employs a non-wearing



electronic component rather than a rheostat or transformer to step down power. Approved for 400-watt incandescent lighting control, the Select-A-Switch replaces existing standard single-pole switches and is just as easily installed.

The Select-A-Switch, catalog No. V-400, is a center-off three-way electronic switch offering 100 per cent-off-30 per cent lighting ranges designed for use in household and other applications where two ranges of light may be desired. It uses approximately 60 per cent less power when in low position and operates on 115/125 volts, a-c.

Write P-317 on reply card, pg. 17

Chase-Shawmut fuse

A new one-time fuse made by the Chase-Shawmut Co., 374 Merrimac St., Newburyport, Mass., is considered by the company to be a major advance in this type fuses.

Except for the silver-plated contacts, the new product differs only in performance, not in appearance. It has long time delay, low wattage loss, and gives predictable performances.

This all new fuse is listed by Underwriters' Laboratories. It saves power because it runs up to 38 per cent cooler. Time current curves show that it has up to seven times the delay of ordinary fuses. It meets all applicable Federal specifications and exceeds all industry standards for one-time fuses.

In fact, the device is one of the few one-time fuses specifically designed to meet the safety requirements of modern a-c and d-c circuits.

Write P-318 on reply card, pg. 17

Miller DMR fluorescent

The Miller Co., Meriden, Conn., has cataloged a new dust- and moisture-resistant fluorescent lighting fixture, for food handling and proc-

SPLICE

Without WIRE TWISTING

EXPECT THE BEST FROM BUCHANAN. For instance, Buchanan's new 2008S Steel Splice Caps make better wire splicing faster than ever. They won't pull off, twist off or shake off of even untwisted wires. Crimp with Buchanan's reliable C24 pres-SURE-tool.

The 2008S clamps conductors in a vise-like crimp. Its exclusive fluted design strengthens the cap, helping to position the 2008S in the tool, and serving as a starting point for the tool's indenters. When the 2008S Splice Cap is crimped, the flutes confine the conductors in a tight area. Wires are flattened and deformed lengthwise for wire-to-wire contact. There are no voids between conductors, thereby eliminating looseness.

You insulate completed 2008S splices with Buchanan's 2007 Snap-On Nylon Insulators. They go on with a snap; provide quickest insulation in shortest time—even on fine wires and in coldest weather.

Get complete details about the new 2008S Splice Cap now. Call your nearest Buchanan representative or write for Bulletin 5-3.

Actual Size

Splice caps listed as "pressure-type wire connectors" and "fixture-type splicing connectors" for 2 #18 thru 4 #12's. Insulators UL and CSA listed for 600 v. on building wire and 1000 v. in fixtures, in applications up to 105°C. (221°F.)

BUCHANAN a subsidiary of ESNA

BUCHANAN ELECTRICAL PRODUCTS CORPORATION
HILLSIDE, NEW JERSEY
In Canada: ESNA CANADA LIMITED, Toronto 16

essing locations, laundries, printing plant press rooms, service station lubricating and washing areas, washrooms, shower areas, locker rooms, and similar areas.

Called "the DMR unit", its special features are designed for better performance where cleanliness is important and wherever it is desirable to protect lamps, electrical components, and reflecting surfaces from dust, dirt, moisture, and other foreign matter.

An exclusive and important feature, pointed out by Miller engineers, is the completely smooth top which permits mounting the fixture flush against the ceiling, thus preventing flour dust or other food particles from accumulating on the top side to ferment and attract vermin.

The Miller DMR unit is a two-lamp, four-foot unit for individual or continuous mounting. It is available with either a clear or diffusing Acrylic plastic enclosure.

Write P-319 on reply card, pg. 17

Spreadliter floodlights

Wide horizontal spread, the economies of mercury vapor lighting, and the high efficiency of parabolic reflectors are combined in relatively low initial cost Spreadliter floodlights introduced by the Steber Division of

the Pyle-National Co., 1334 Kostner Ave., Chicago 51, Ill.

Spreadliter features include uniform distribution without hot spots; full 18-inch parabolic Anadol finished aluminum reflectors, which avoid trapped light; fin-cooled aluminum socket housing for greater efficiency; simple installation with universal adjustment; easy servicing, requiring no tools for cleaning and lamp changing; and sturdy construction of low overall weight.

Combination pole top floodlights with ballast are available as a complete package. Spreadliters for remote ballast mounting are also available in wall, crossarm, pipe clamp, and pole-top types.

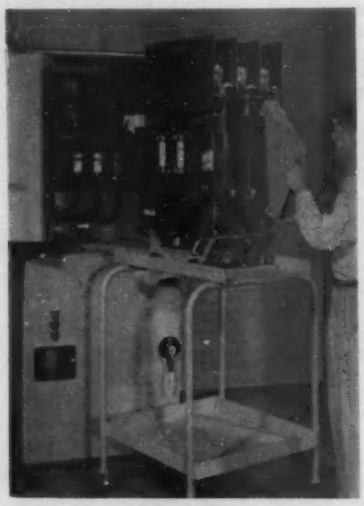
Write P-320 on reply card, pg. 17

Compact motor control

A new concept in high voltage motor control was announced recently by Allis-Chalmers Manufacturing Co., 938 S. 70th St., Milwaukee 1, Wis. The Space-Maker unit is exactly one-half the size of previous models, yet with the same rating and capacity as its predecessors.

Some of the features introduced by the new controller include one of the first starters in the 2,000- to 5,000-volt range to employ a two-high design for space saving and one of the first completely drawout controls on the market. The unique design is possible because of a compact new 400-ampere, 5-kv, 5-mva, Type 456 air contactor that yields significant operating benefits with use of glass polyester insulation.

The control has two full-voltage, high-capacity motor controllers, one above the other. Each can have a



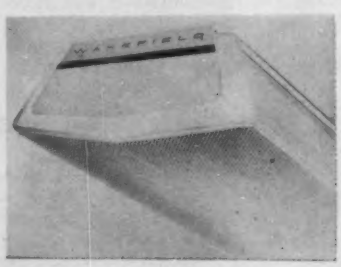
full rating of up to 1,750 hp maximum at 2,300 volts or 3,000 hp maximum at 4,000-5,000 volts. Each has interrupting capacity of 150 mva at 2,300 volts or 250 mva at 4,000-5,000 volts by use of current-limiting fuses.

Write P-321 on reply card, pg. 17

Wakefield compact

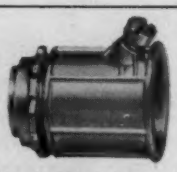
A new compact lighting fixture with a prismatic refractor design has been developed by the Wakefield Co., Vermilion, Ohio.

Trademarked Photometric, the new



Insulated Conduit Bushings, malleable and aluminum.

Insulated Ground Bushing with Lug, malleable and aluminum.



Greenfield Set Screw Type Connector, die cast.

NEW QUALITY PRODUCTS FROM RATTAN

More new products, designed for better electrical work by the quality-minded engineers at Rattan . . . one of the nation's oldest and most dependable manufacturers of electrical fittings! For solid performance and complete dependability, insist on the all-inclusive RATTAN line!

NEW COMPLETE CATALOG UPON REQUEST

THE ORIGINAL MARR WIRE CONNECTOR

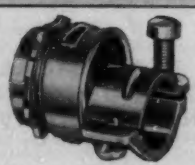
CAP MADE OF PHENOLIC COMPOSITION

No. 00 to No. 4 No. 7 (Porcelain)

THE RATTAN MANUFACTURING CO.

NEW HAVEN 7, CONN.

Sales Agencies and Warehouse Stocks in Principal Cities Throughout the Country



Greenfield Hinge Type Connector, die cast.

#T202 — Stamped Steel Rattan - Tomic Twist - in Angle Connector.

#194 ¾ ¾" 90° Connector, malleable.

fixture is designed for both close ceiling and stem mounting. A sliding hanger facilitates stem mounting. The fixture is available in either four- or eight-foot lengths and measures less than four inches in depth.

The molded refractor allows the units to be connected in luminous rows with no opaque metal between them to cause distracting contrast.

The prismatic refractor is molded of Styron Verelite, a light stabilized polystyrene developed by the Dow Chemical Co.

Write P-322 on reply card, pg. 17

Appleton aluminum fittings

Recently announced by the Appleton Electric Co., 1701-1759 Wellington Ave., Chicago 13, Ill., is a line of copper free (less than one per cent copper content) aluminum fittings ideally suited for use in environments subjected to severe corrosive conditions.

These fittings, which can be used with either ferrous alloy or aluminum conduit, form their own natural coating of corrosion resistant aluminum oxide. This coating, if destroyed by abrasive action, is re-formed immediately for a continuous corrosion resistant good finish.

For this reason, according to the company, these fittings are finding wide acceptance in such diverse installations as breweries, dairies, food processing plants, and other installations where corrosion is a problem.

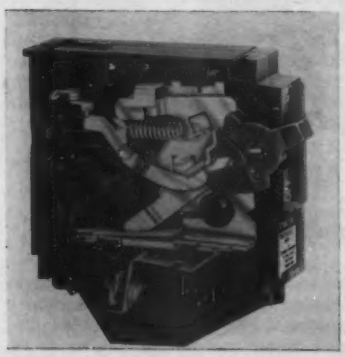
Appleton's aluminum fittings weigh about 33 per cent less than similar fittings of other metal content.

Write P-323 on reply card, pg. 17

Bryant circuit breaker

Bryant Electric Co., Bridgeport 2, Conn., engineers have designed a circuit breaker mechanism for back-to-back assembly in a circuit breaker case of standard size.

The resulting duplex breaker incorporates all the electro-mechanical features of the best single circuit breakers including reliability. The salient physical feature is space saving—an eight-circuit, duplex breaker load center will fit in the



THERMADOR

"Seven Leagues Ahead" in the science of electric heating

THERMADOR

Bilt-in Electric Heaters

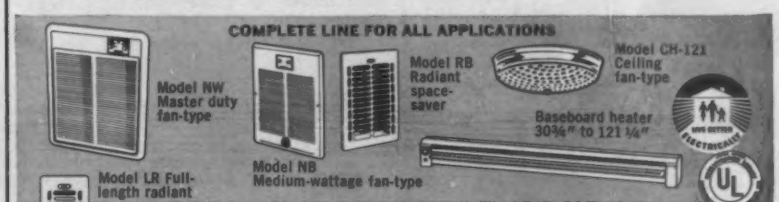
Millions in Use

New fan-type Ceiling Heater Model CH-121 (shown above) gives instant radiant heat, circulates warm air gently throughout the room. Quiet 6½" suction fan draws cool air into the center of the heater, forces warm air out the perimeter. No direct blasts of air — no uncomfortable drafts.

Installation is easy, in existing or new construction. Flush-to-ceiling mounting — **no rough-in box** needed. U.L. approved for surface mounting to a standard 3" or 4" junction box, with or without plaster ring. Neoprene rim gasket conforms to ceiling irregularities.

Other advantages: Completely **corrosion-proof** housing, instant nichrome heating coil, aluminum grille and reflector, interference-free motor, safety overheat link easily accessible.

Space-saving, too! Diameter, 14¼" over the gasket. Projects only 3½" from ceiling. 1250 watts (4268 BTU's) or 1500 watts (5118 BTU's), 120 volts, AC, 60 cycle.


COMPLETE LINE FOR ALL APPLICATIONS
Model NW Master duty fan-type
Model NB Medium-wattage fan-type
Model RB Radiant space-saver
Model CH-121 Ceiling fan-type
Baseboard heater 30¾" to 121 ¼"
Model LR Full-length radiant

Originator of the Fan-Type Bilt-in Electric Heater

THERMADOR Electrical Manufacturing Co.

Division of Norris-Thermador Corporation

5119 District Blvd., Los Angeles 22, Calif., Dept. 426

Please send me illustrated literature on Thermador Electric Heaters.

☐ Architect ☐ Electrical Contractor ☐ Builder ☐ Wholesaler ☐ Dealer

Name_____

Address_____

City_____ County_____ State_____

Latrobe PRODUCTS

★FLOOR BOXES ★ WIRING SPECIALTIES★

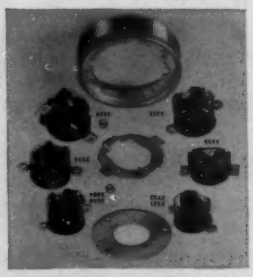
Short Stem
TELEPHONE
and
DUPLEX
NOZZLES
BRASS
AND
ALUMINUM

Shorter styled, modern, flanged duplex telephone and receptacle nozzles in satin brushed brass or anodized aluminum. Standards fit ½" opening. ¾" stems available. Also grounded receptacles.

ADJUSTABLE
STEEL BOX

This is our #190 series, with a 3¼" brass cover plate. Comes in two standard heights-3⅛" and 2⅝" minimum. Designed for power or telephone service. A "KEY" (shown in center of photo below) which fits most popular size and style receptacles has been added at no extra cost.

Adjusting ring for our 190 series is so designed that KEY drops easily into special slots. You select the receptacle required and simply "LAY-IN", then "LAY-ON" receptacle ring. That's it.



CAST IRON
ADJUSTABLE BOX

Watertight Floor Box — 3½" or 4¼" brass cover plate with 2" or 2⅜" abandon plug for power or ½", ¾" or 1" for telephone service or duplex receptacle nozzles. Equipped with ground wire.

INSULATOR SUPPORTS

Malleable iron clamps of high tensile strength. Fastens to steel framework without punching holes. Four sizes — 1", 1½", 2" and 2½".

LATROBE PRODUCTS

NON-ADJUSTABLE FLOOR BOXES—ADJUSTABLE FLOOR BOXES—GANG BOXES—COVER PLATES—JUNCTION BOXES—NOZZLES—PIPE OR CONDUIT HANGERS—INSULATION SUPPORT—CABLE SUPPORTS—FISH WIRE STAPLE AND CABLE CLIPS

Write for Complete Catalog

Sold only Thru Wholesalers

FULLMAN MANUFACTURING CO.
LATROBE . . . PENNSYLVANIA

same space into which a four-circuit, single breaker load center fits.

The breaker mechanism is mechanically attached to a rigid steel back plate. This design assures accuracy of contact-arm movement and freedom from case warpage that could disarrange the trip characteristics.

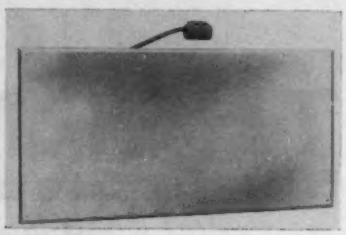
This independence of mechanical support from the urea plastic breaker case is the unique feature of the design.

Write P-324 on reply card, pg. 17

Aluminum heating panels

American-Standard, 40 W. 40th St., New York 18, N. Y., has announced its full scale entry into the field of electric heating, with a wide range of new products.

The line, which will be marketed under the trade name "Electri-Warm," marks the company's first



venture into the zonal heating field.

Among the new products in the Electri-Warm line are ceiling panels No. 600 (500-watt, 120-volt), and No. 601 (500-watt, 240-volt). These factory assembled, printed circuit aluminum heating panels provide two and one half times the heating output of ceiling cable without the installation problems and limitations.

This advanced approach to radiant heating is unobtrusive, clean, quiet, economical, and maintenance free. The panels can be painted to match the surrounding decor. Both standard and deluxe selection of line voltage controls are available, and the panels are listed by Underwriters' Laboratories.

Write P-325 on reply card, pg. 17

Pyramid cable tester

A new tool, designed to help any electrician easily trace and identify conductors in cables and conduits, by himself, in less time and with less effort than most previous methods, has been announced by the Pyramid Instrument Corp., 630 Merrick Rd., Lynbrook, N. Y.

This new Amprobe cable tracer will trace up to ten conductors or pairs at one time without the need for buzzers, bells, or a helper.

The cable tracer consists of the tester and ten numbered station blocks. In operation, the ends of the conductors to be traced are plugged into the station blocks. The other ends

are plugged into the tester itself. Numbers on the tester, corresponding to the numbers of the station blocks, light up to identify the conductors.

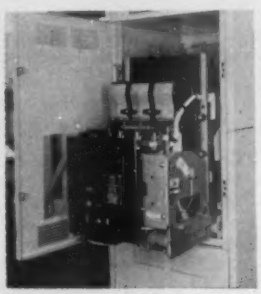
Completely self-powered, the device (less than six inches long) also offers the serviceman or contractor a foolproof way for testing for opens and shorts.

Write P-326 on reply card, pg. 17

I-T-E circuit breakers

I-T-E Circuit Breaker Co., 1900 Hamilton St., Philadelphia, Pa., announces the availability of new, low-voltage current-limiting circuit breakers which provide economical high-speed protection against fault currents up to 200,000 amperes.

The new, versatile K-Don breakers



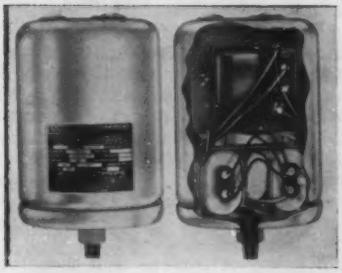
integrate—in a single switchgear compartment—the fast-acting, high-capacity fault protection of Amp-trap current-limiting fuses with the protective features of its K-Line stored-energy breakers, and a unique device that prevents single phasing.

They provide this additional current-limiting insurance without sacrificing adjusting flexibility of the circuit breaker needed for overcurrent and medium-capacity short-circuit tripping.

Write P-327 on reply card, pg. 17

Sola lamp transformers

A complete line of mercury lamp transformers in lightweight, weather-resistant aluminum cases has been announced by Sola Electric Co., Busse Road at Lunt, Elk Grove, Ill.



The deep-drawn cases are hermetically sealed against weather by mechanical pressure and a special sealant that resists attack by water, sunlight, oxidation, corrosive fumes, oils, solvents, and salt spray.

Bonded tightly to the aluminum case, it successfully withstands vibration and mechanical shock as well as temperature cycling. A watertight fit is further insured by extruded neoprene bushings which enclose the transformers, marked and color-coded neoprene jacketed leads.

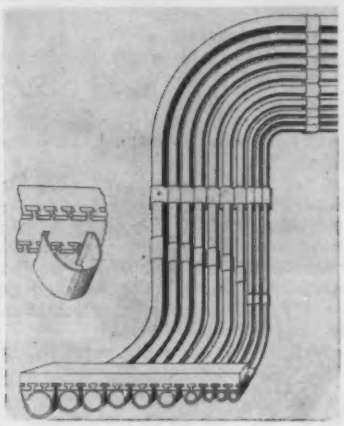
Write P-328 on reply card, pg. 17

Conduit bank hanger

A new hanger for banks of electrical conduit and pipe, designed to cut costs sharply and offer improved construction features, is announced by the Stamperhanger Co., 1634 Telegraph Ave., Oakland 12, Calif.

Features include one-piece clamps, immediate and automatic alignment that is permanent even though workmen step on the pipe, interchangeability of pipes within the bank without moving adjacent pipes, and a wide variety of clamp sizes. The same clamp fits iron and other pipes. Clamps are small in bulk and nest together for easy handling.

Conduit or pipe is held against a channel iron by spring alloy aluminum clamps which merely slide over the pipe and are held by slots in the channel. A cam on the clamp holds it in place. Installation and removal of clamps is simple and fast.



Write P-329 on reply card, pg. 17

Efcor capped bushing

A new capped bushing has been designed for use with rigid conduit by the Electrical Fittings Corp., 37-50 57th St., Woodside 77, N. Y.

A standard malleable iron bushing is capped from the inside with a water resistant paper penny. The design protects conduit from getting clogged with dirt or concrete. It cannot pop off, yet is easily removed by punching through with a screwdriver. The remaining paper acts as insulation in wire pulling.

The penny also prevents loosening of bushing due to vibration. In addition, it is easy to write on and can be coded.

Write P-330 on reply card, pg. 17

Cavalier electric baseboard

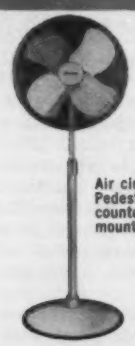
Cavalier Corp., 343 W. First St., Chattanooga 2, Tenn., introduces their new CL-A automatic electric baseboard which comes in four-, six-, eight-, and ten-foot lengths for the fastest possible installation.

Attached to walls with two screws or two nails through pre-punched

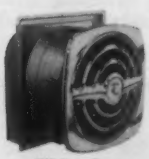
Chelsea

A COMPLETE LINE OF QUALITY VENTILATING EQUIPMENT

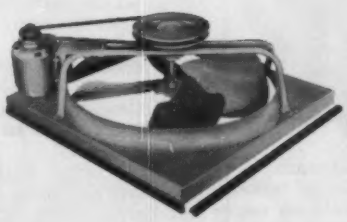
Packed with features that SELL!
Priced for Profits that SOAR!



Air circulators for Pedestal, wall, counter or ceiling mounting.

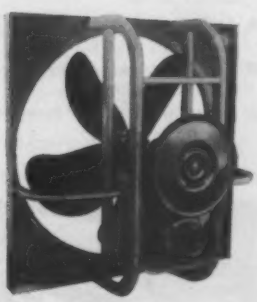


Kitchen Fans



Deluxe and Project Attic Fans for wall or ceiling mounting 24"-60"

Axial and Centrifugal Roof Ventilators 150-50,000 CFM



Belt and Direct Drive Industrial Fans 12"-108"

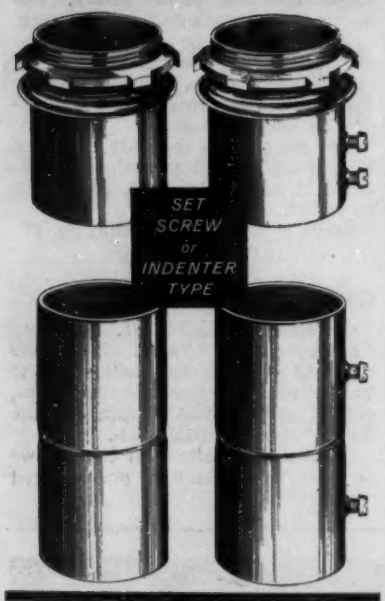
Offering the most complete line of ventilation equipment in the industry for 35 years, during which period fans and blowers have been our only product thus assuring 100% concentration of engineering and production time and talent to the solving of ventilating problems and producing the finest equipment available. And the entire line of commercial, industrial and residential equipment is priced right too—priced to sell. Send for your copy of our new 1961 catalog.

CHELSEA
FAN & BLOWER CO., INC.
PLAINFIELD, NEW JERSEY
REFER TO THE LISTING OF CHELSEA MANUFACTURERS' AGENTS IN THIS ISSUE

ETP

U.L. SOLID ONE PIECE • CONCRETE TIGHT E.M.T.

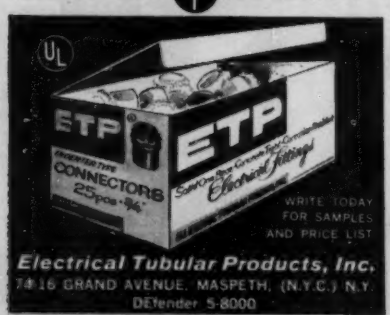
Electrical Fittings



Why settle for ordinary couplings & connectors when ETP gives you all these EXTRAS:

- Sparkling corrosion-resistent zinc chromate overplating for lasting performance.
- One piece tubular steel — cannot open or spread.
- Concrete tight. Far surpasses ULL. File Card E 24708.
- Exclusive pre-set, deep-slotted staked heavy duty locknuts.
- Special formula soft steel for easiest indenting.
- Competitively priced! Boxed every size from ½" to 2".

CONNECT WITH ETP FOR ECONOMY

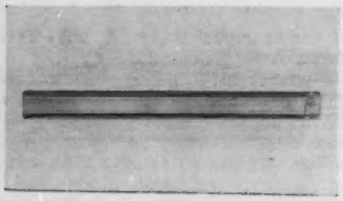


Electrical Tubular Products, Inc.

7816 GRAND AVENUE, MASPETH, (N.Y.C.) N.Y.

DEfender 5-8000

REPRESENTED BY: Florida: Electra, 3150 N. W. 40 St., Miami; Texas & Okla.: Brenner Elect., Box 51, Houston; N. C., S. C. & Va.: Robert, Winfrie, Box 1744, Annapolis, Md.; Miss. & La.: F. C. Baldridge Co., 302 Eureka Bldg., New Orleans 12.



holes, each length is pre-wired and completely self-contained, ready for installation.

The new baseboard features new thermal cut-out for automatically controlled safety. This thermal cut-out is a sensitive tube that extends the full length of every unit and prevents the baseboard from ever becoming overheated.

It automatically cuts off electricity if any object should fall over the baseboard and obstruct the air flow. When the obstruction is removed, the baseboard goes right back to work automatically.

The built-in thermostat was designed specifically for this baseboard and slips easily and quickly into the space provided. The baseboard is reversible end for end so the built-in thermostat can be at either end desired. A wall-mounted thermostat can be used if desired.

Write P-331 on reply card, pg. 17

Slater wall plate

Slater Electric and Manufacturing Co., Inc., 45 Sea Cliff Ave., Glen Cove, Long Island, N. Y., recently introduced its decorated wall plate made of Cynamid's Beetle urea plastic with a decorative overlay.

The two designs currently available are a gold scroll and a rose pattern. This plate is easily cleaned,

cannot rust, and does not stain.

The screws are of a special formula nylon which provides uniform coloring in the head of the screw and will not chip.

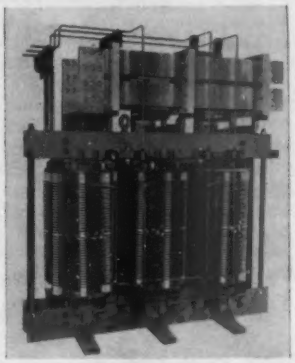
Write P-332 on reply card, pg. 17

Niagara transformers

Niagara Transformer Corp., P.O. Box 23, Buffalo 25, N. Y., has designed and developed a new, standardized line of class B ventilated dry type transformers in single and three-phase construction.

Primarily for indoor installation, the new line is designed to deliver quiet, economical performance in plants, schools, hospitals, and public buildings. Each model is design-checked to operate at four to five decibels below new 1960 NEMA standards. All core and coil assemblies are thoroughly tested to conform to both NEMA and ASA specifications.

Because of advanced design features and rugged, yet lightweight



construction, Niagara class B transformers occupy minimum space. Terminal arrangements and liberal wiring area permit primary and secondary cable entrance from either end of the enclosure.

Write P-333 on reply card, pg. 17

Perfect-Line cover

For the unusual and more difficult receptacle installations, Perfect-Line Manufacturing Corp., Old Country Rd., Hicksville, N. Y., has especially developed its durable new WR86C weatherproof cover assembly with a 360 degree swivel snap-cap. The complete cover may be swiveled to any point within a full circle and locked in place.

The WR86C accepts all standard single-gang receptacles including 20- and 30-ampere three-wire twist-lok types. Its novel swivel feature and its suitability to all receptacles make the WR86C a universal, handy cover assembly.

Made of heavy gauge solid brass, the cover plate is supplied with a self-seal gasket and mounting screws.

Write P-334 on reply card, pg. 17

A-C controls centers

Redesigned motor controls centers, available with bus ratings from 600 to 1,600 amperes and voltage ratings from 110 to 600 volts, which provide

for longer life, greater versatility, and easier maintenance, are available from Allis-Chalmers Manufacturing Co., Milwaukee 1, Wis.

Horizontal buswork can be installed at either top or bottom of the 20-inch wide 20-inch deep motor control centers. Vertical buswork is braced for 50,000 rms (interrupting capacity) compared with the former 25,000 rms, thereby saving future cost of adding capacity to match other electrical equipment.

The six vertical bus supports are of nonbreakable, glass-filled polyester and are curve molded to eliminate dust catchers that can cause shorts.

Write P-335 on reply card, pg. 17

G-E Quartzline lamp

A 1,500-watt Quartzline incandescent lamp designed to operate on 240-volt power supplies has been announced by General Electric Co., Nela Park, Cleveland 12, Ohio.

Previous Quartzline lamps were available in 500-watts, operating on 120-volts, and 1500-watts, for 277-volt operation; however, in many areas where the lamps can be used effectively, only 240-volt power is available.

Quartzline lamps differ physically from other incandescent types in that they come in quartz tubes, less than half an inch in diameter, rather than in glass bulbs.

The lamps feature a revolutionary iodine cycle, in which evaporating tungsten particles, which otherwise would darken the inside wall of the tube, are continuously redeposited on the filament.

Quartzline lamps are used to floodlight industrial, commercial, and institutional buildings, inside and outside, and such areas as football fields, race tracks, golf courses, and other similar facilities.

Write P-336 on reply card, pg. 17

YOUR BEST BUY IN TAPE

FRICTION
RUBBER
PLASTIC

ACCURATE TAPE

ACCURATE MANUFACTURING CO
Garfield, New Jersey

NONE BETTER than KNOX WIREHOLDERS

The No. 5009 has been designed to satisfy the most critical requirements — metal parts in tension and porcelain in compression. All steel parts are HOT-DIP GALVANIZED. The Porcelain has been designed with well-rounded edges and provides a larger, pulley-action wire hole. The spun solid copper rivet interlocks the Insulator with the metal portion of the Wireholder. Extra sharp screw thread for easy starting and full threaded. The heavy screw-shank base offers high resistance to side pull. KNOX No. 5009 Wireholders far surpass recommended ratings on standard house service conductors. This Wireholder can also be supplied with 22 x 3" and 22 x 4" Screws.

No. 5009

KNOX has numerous styles and types of Porcelain Wireholders.

No. 418 HEAVY DUTY

No. 411 MEDIUM DUTY

No. 405 LIGHT DUTY

Always Specify KNOX WIREHOLDERS

KNOX PORCELAIN CORPORATION
KNOXVILLE 1, TENNESSEE

Send for Catalog

Technical books

for the electrical man

Fluorescent manual

"Fluorescent Lighting Manual," Third Edition, by Charles L. Amick, Director, Research and Development, Day-Brite Lighting, Inc. Published by McGraw-Hill Book Co., Inc., 327 West 41st St., New York 36, N. Y., 416 pages, 244 illustrations, $12.50.

This practical guide to design, installation, and repair of fluorescent lighting systems, which first appeared just a short time after fluorescent lamps were introduced commercially, has again been published in a new edition, up-dated and revised to bring it abreast of modern practice.

Basically, it retains a clear, simple treatment, covering the principles and procedures for calculating illuminating requirements, the design of luminaires and auxiliary equipment, and practical methods to use in maintaining and repairing all parts of any fluorescent lighting system.

Essential details of lamp sizes and ratings, operating principles, auxiliary equipment, methods of installation, color information, and typical applications are described, as well as necessary procedures to follow for designing general and supplementary lighting systems, selecting appropriate fluorescent lamp fixtures, and analyzing and correcting service problems.

Full treatment is given to the economics of lighting—including a comparison of the cost factors of fluorescent and incandescent lamps.

Residential lighting

"Lighting — Keyed to Today's Homes." Published by the Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y., 92 pages, 271 photographs and construction drawings, $1.50.

Written by a sub-committee of the IES Residential Lighting Committee, headed by Myrtle Fahsbender of Westinghouse Lamp Division, the book contains the most current, practical guides to functional and decorative residential lighting, and is written in layman's language.

The nine chapters discuss architectural lighting, ceiling and wall fixtures, portable lamps, lighting for decorative accent, lighted interiors, outdoor living and gardens, dimmers for light control, light sources, and interior design characteristics.

In the appendix are color and wood reflectance charts, a glossary of lighting terms, and a list of references.

The price per copy is reduced on quantity orders.

Code diagrams

"Electrical Code Diagrams," Third Edition, by B. Z. Segall. Published by Peerless Publishing Co., 515 Lafayette St., New Orleans, La., $20.00.

This edition is an entirely new and re-edited book. All the material has been revised to conform to the new format of the 1959 National Electrical Code. Many new diagrams have been added.

It is bound in a loose leaf binder of exceptional quality and durability. As new Code editions are forthcoming (the 1962 Code is now in the process of being developed), owners of this book will only have to purchase a new set of pages to augment or correct this present set of Code diagrams. These new pages will cover only the new material and changes of each new Code.

The new book contains diagrams to completely cover chapters 2, 3, and 4 of the Code. Chapter 5 will cover completely all material in Articles 500 to 517, inclusive. No other material will be covered, since experience has shown the demand to be centered in these areas. If the need arises, other sections will be added.

Ultrasonics

"Ultrasonics and Its Industrial Applications," by O. I. Babikov. Published by Consultants Bureau Enterprises, Inc., 227 W. 17th St., New York 11, N. Y., 230 pages, $9.75.

Ultrasonics, one of industry's most exciting new tools, is dealt with in all its technical aspects in this new book, translated from Russian.

While the volume covers recent Soviet advances in this field, its scope is universal, and it will serve as an indispensable aid to all technicians and scientists interested in the industrial applications of ultrasound.

The author discusses fully ultrasonic control methods, the action of high-intensity ultrasonic oscillations on various technological processes, ultrasonic drilling techniques, and ultrasonic pulse methods of flaw detection and physicochemical research.

NEW EDITION

ELECTRICAL ESTIMATING GUIDE

Covers Over 2000 Wiring Jobs

This new, entirely different estimating guide has 200 completely worked out charts.

Authentic, Time Saving—Easy to Use

This book is easy to use—it has no complicated mathematics or formulas to work over. You merely determine the nature of the wiring, check it in the BLUE BOOK OF ELECTRICAL ESTIMATING and there's your answer—it's the simplest estimating book ever written.

7 DAYS FREE TRIAL

This book was written by a successful electrical contractor and estimating engineer with over 20 years' experience. It has an entirely different method of determining estimates on wiring jobs. Electrical contractors, journeymen, architects, and engineers will find use for this book every day. Gives time required to do jobs along with complete labor charges in every state in the country. Check the PRODUCTIVITY of your men with this authentic, field tested book. Order this book now from your supplier at special introductory price of $8.25 or send coupon below.

ESTIMATING HANDBOOKS ASSOCIATES — 5848 N. LEONARD AVE., CHICAGO 30, ILL.

Send me the NEW BLUE BOOK OF ELECTRICAL ESTIMATING for 7 days free trial. I understand I may return the book within 7 days and owe nothing. If I keep it I will pay $8.25 plus postage for shipping.

NAME

ADDRESS

TOWN ZONE STATE

☐ I enclose $8.25 to save shipping cost.

☐ Send C.O.D. I'll pay postman $8.25 plus C.O.D. fee on delivery.

(March 1961)

Helpful literature

available to our readers

A brochure describing **coated glass fabrics** for electrical applications is now available from Dept. WO-507, **Irvington Div., Minnesota Mining and Manufacturing Co.,** 900 Bush Ave., St. Paul 6, Minn. The publication illustrates uses for Irvington brand coated glass fabrics. A variety of applications are shown, including hand wound and stick wound transformer coil insulation, heavy duty transformer coil insulation, and motor end turn coil insulation.

Write B-337 on reply card, pg. 17

A new 28-page publication from **General Electric Co.,** 1 River Rd., Schenectady 5, N. Y., discusses advantages of G-E's new dry-type integral **distribution centers** featuring quiet, high-temperature dry-type transformers for applications up to 5,000 volts. Bulletin GEA-6928A describes space-saving benefits and construction features of a typical integral distribution center. The illustrated publication contains step-by-step ordering and specifying information along with tables of ratings, dimensions, weights, and list prices.

Write B-338 on reply card, pg. 17

A new four-page catalog illustrating and describing the company's improved model of the "800" standard **floor box** and a new "800-CI" series cast iron floor box is now available from **National Electric Div., H. K. Porter Company, Inc.,** Porter Building, Pittsburgh 19, Pa. The literature reviews the improvements made to the "800" series and outlines the design features of the new "800-CI" floor box which was developed for positive waterproof installation. All components shown in the catalog can be used with both boxes.

Write B-339 on reply card, pg. 17

Literature available from the **Trine Manufacturing Corp.,** 1430-42 Ferris Place, New York 61, N. Y., describes in detail the new **door bell push button display** showing that company's new electric door bell push buttons. The new No. 68 display features lighted push buttons, including the new lighted name button as well as snap-ons, both lighted and unlighted. Specifications on all bells on the display are included in the catalog.

Write B-340 on reply card, pg. 17

An illustrated, eight-page bulletin, No. 160, published by **Niagara Transformer Corp.,** P. O. Box 23, Buffalo 25, N. Y., features the full line of Niagara's new class B **ventilated dry type transformers.** Fully described are insulation, core and coil construction, enclosure construction, paint finishes, sound dampening, natural and forced air cooling, terminals, impregnating, and heat curing processes.

Write B-341 on reply card, pg. 17

Brochure 14-B2 from the **Furnas Electric Co.,** 1064 McKee St., Batavia, Ill., describes new design **Magnetic starters** featuring unitized construction with all components front removable. Plug in push-button or selector switch units are easily added in the field. Thermal overload relays have trip indicator, are non-adjustable and tamper proof. Third overload can be either factory or field mounted. Dual voltage 110/220 or 220/440 dual cycle 50-60 coils are standard at no additional cost.

Write B-342 on reply card, pg. 17

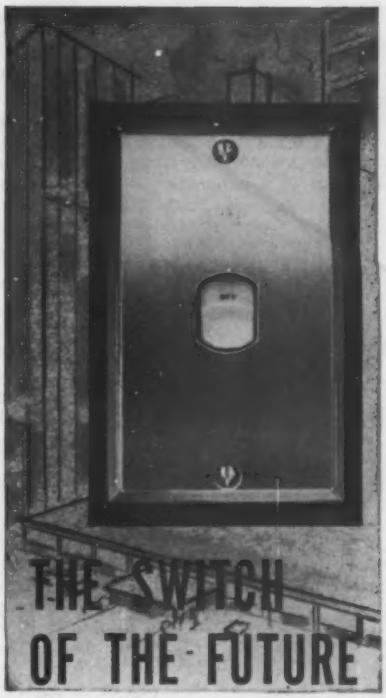
Complete information on combination **light and air diffusers** is contained in a new 24 page catalog prepared by the **Barber-Colman Co.,** 1300 Rock St., Rockford, Ill., and **Day-Brite Lighting, Inc.** The catalog takes you briefly through the history and evolution of lighting and air distribution, from the kerosene lamp and pot bellied stove up to today's versatile combination light and air diffusers. Data for selecting and predicting performance, and drawings illustrating how the new combination light and air diffusers are installed and balanced, are included.

Write B-343 on reply card, pg. 17

Advantages of **underground distribution** for commercial and industrial areas are presented in a new brochure available from **R T & E Corp.,** 1900 East North St., Waukesha, Wis. The eight-page booklet also contains construction features, dimensions and weights for the company's three-phase Terra-Tran transformers, 75 kva to 300 kva. Also included is a chart showing designations of voltage ratings for the three-phase transformers, as well as a diagram illustrating mounting pad construction.

Write B-344 on reply card, pg. 17

Primary electric heat system distributors, architects, contractors, and engineers will find a new **"heat computer"** offered by **Arvin Industries, Inc.,** 13th and Big Four R.R., Columbus, Ind., of great help in figuring heat loss and cost for electrically heated homes and other buildings. The booklet shows wattage loss for six significant areas: windows, doors, walls, ceilings, floors, and by infiltration. It also contains charts showing



is being used NOW! . . .

P&S ROCKER-GLO SWITCH

Many of today's switches are specialties primarily designed for appeal in decoration. Others are designed to meet the rugged use and performance called for by a heavy duty switch.
Now, one new switch, Rocker-Glo, combines eye-appealing design with heavy duty performance. So impressed with this combination are architects, engineers and contractors that Rocker-Glo is already being specified in leading hotels, motels, hospitals, commercial buildings and housing developments. Rocker-Glo has high-grade silver alloy contacts. Its modern design and unique construction allow this switch to be pressed, pushed, rocked or rolled into instantaneous action.
Rocker-Glo switches are designed to be used at full current rating on tungsten filament and fluorescent loads. Available in Despard interchangeable type, Despard type mounted on a strap and narrow rocker for tumbler switch plates. A specification grade switch, 15 and 20 amps. 120/277 volts AC.

P&S *Write for free Rocker-Glo bulletin — Dept. ES-361.*

PASS & SEYMOUR, INC.
SYRACUSE 9, NEW YORK

60 E. 42nd St., New York 17, N.Y. • 1440 N. Pulaski Rd., Chicago 51, Ill. • In Canada: Renfrew Electric Co., Ltd. Toronto, Ontario

outside design temperatures throughout the country and an annual degree-day map.

Write B-345 on reply card, pg. 17

The "Floodlighting Handbook," a new bulletin from the **Spero Electric Corp.**, 20500 St. Clair Ave., Cleveland 17, Ohio, covers selection, specification, and installation of **floodlights.** Complete illustrations and diagrams are included, along with detailed catalog data.

Write B-346 on reply card, pg. 17

Allied Radio Corp., 100 N. Western Ave., Chicago 80, Ill., has released its 1961 catalog of **electronic equipment.** Special emphasis has been placed on electronic equipment for industry. Allied's new 576-page catalog, the largest catalog published by any electronics supply house, lists over 48,000 items and includes 240 pages in rotogravure. The catalog includes extensive listings of parts and equipment for industrial maintenance, research, and production requirements. Immediate delivery from stock, factory prices, and quantity discounts are features of special interest to the industrial purchaser.

Write B-347 on reply card, pg. 17

How the new **Regu/Tran unit** assembly provides greater load tap-changing flexibility, better service continuity, and less maintenance cost is told in a new bulletin released by **Allis-Chalmers,** Milwaukee 1, Wis. The bulletin shows how the Regu/Tran unit offers independent phase regulation with three-phase unit assembly and solves the problem of handling unbalanced loads and of varying lengths of single-phase feeders.

Write B-348 on reply card, pg. 17

A new 16-page catalog, No. 159-D, covering Keystone JIC and NEMA type 12 **wiring installation equipment,** is now available from **Keystone Manufacturing Co.**, 23328 Sherwood Rd., Warren, Mich. The catalog describes and illustrates the complete line of wireways, fittings, and enclosures designed and manufactured to meet JIC and NEMA Standards. A wide variety of liquid-tight units are included for applications where wiring must be protected against dust, dirt, oil, water, and coolants. Complete data for all items includes dimensional drawings plus exact specifications.

Write B-349 on reply card, pg. 17

TA Manufacturing Co., 4607 Alger St., Los Angeles 39, Calif., an authority in the design and application of **clamps,** has developed a manual every engineer should have as reference. This 76-page illustrated engineering design manual offers a compiled listing of materials and specifications, recommended application, and the latest technique for mounting tubing, wiring, and similar hardware.

Write B-350 on reply card, pg. 17

A handy guide to the most frequently ordered products of the **Superior Electric Co.**, Dept. PG, Bristol, Conn., is small enough to fit easily into a desk file or three-ring binder. It covers ratings and other essential technical data on Powerstat **variable transformers,** Stabiline automatic voltage regulators, Supercon electrical connectors, Superior five-way binding posts, Dub-L-Plug dual electrical connectors, Slo-Syn synchronous motors, Flexiformer packaged transformer primaries, Powerstat decade line correctors, Exel loading reactors, and Varicell adjustable a-c/d-c power supplies.

Write B-351 on reply card, pg. 17

A new technical bulletin containing valuable information of special interest to electrical engineers, consulting engineers, plant engineers, and electrical contractors covering **transformers and substation equipment,** has been published by the **Sorgel Electric Co.**, 838 W. National Ave., Milwaukee 4, Wis. The publication provides an accurate, impartial guide for high specification

fit
any make
tank...
with VULCAN
IMMERSION
HEATERS
Vulcan Immersion Heaters offer a complete range of flanges and bushings that are standard with the various makes of storage type hot water heaters. Approved insulation and rugged terminal screws are standard on all heaters. Heaters are manufactured to meet UL requirements. *Write for catalog.*
VULCAN
Versatility in Electric Heating
VULCAN ELECTRIC COMPANY, DANVERS, MASS.

W. R. C. Smith Publishing Co.

Department ES-3-61 ☐ **New Subscription**

806 Peachtree St., N.E. ☐ **Renewal Subscription**

Atlanta 8, Georgia

You may renew/enter my subscription to ELECTRICAL SOUTH for 3 years.

Name .....

Firm ..... Position .....

P. O. Box or
Street and No. .....

City ..... State .....

☐ Enclosed find $3.00 ☐ Send bill for $3.00

standards, and contains specific information on a wide variety of load center and substation models.

Write B-352 on reply card, pg. 17

A 24-page publication contains selection and application information on the full line of specialty **dry-type transformers** of the **General Electric Co.**, Schenectady 5, N. Y. Prices, dimensions, and specifications for single and three-phase general-purpose transformers, autotransformers and buck-boost transformers, as well as for distribution and voltage stabilizing transformers, are included. The publication also covers mercury-lamp ballasts, integral distribution centers, portable oil testers, and portable insulation testers.

Write B-353 on reply card, pg. 17

The new guide of **Wadsworth Electric Manufacturing Co., Inc.**, Covington, Ky., will help in the selection of the latest in **service equipment** in both fusible and circuit breaker devices. The guide has an easy to use index and is divided into the groups including: industrial safety switches, general duty safety switches, service equipment, distribution panels, "E-Z-Red" circuit breaker, circuit breaker enclosures, and wiring troughs with complete fittings.

Write B-354 on reply card, pg. 17

Now available from the **Electrical Fittings Corp.**, 37-50 57th St., Woodside 77, N. Y., is catalog F-960, covering **electrical fittings** from that company. Complete with full specifications and illustrations, the catalog includes adapters, elbows, nipples, couplings, fittings, benders, bushings, clamp backs, connectors, insulator supports, knockout reducers, and numerous other accessories and related equipment. Also available from the company is catalog B-960, covering switch and outlet boxes.

Write B-355 on reply card, pg. 17

The American Electric Switch Div., **Clark Controller Co.**, 1146 E. 152nd St., Cleveland, Ohio, has published a 20-page illustrated booklet for three-ring binders. The booklet gives installation and application data on a complete line of **fuse panels, service entrance equipment,** general-purpose switches, general-purpose toggle switches, safety switches, industrial switches, and double-throw switches. Cabinet dimensions of all units are also included.

Write B-356 on reply card, pg. 17

AIEE meeting

(Continued from page 92)

without de-energizing or disturbing operation of the transformer in any way. . . . In all cases of early detection, damage to the transformer is minimized, the power system is spared from unnecessary relayed outage, and continuity of service is further assured."

The portable detector "utilizes the principle of a Wheatstone bridge in measuring the increases in the resistance of an accurately calibrated platinum alloy filament exposed to a gas mixture as compared with an identical filament in a sealed housing. A self-contained rechargeable battery and a charger furnish power for operation of the instrument."

Know the law

(Continued from page 107)

" 'Improvement' means any building, structure, erection, construction, demolition, excavation, landscaping, or any part thereof existing, built, erected, placed, made or done on land for its permanent benefit.

"Abbott urges that it appears that the service building by itself was of no benefit to the realty. Further, that the wiring which went into it and under the ground on the property could not be considered an 'improvement' within the meaning of the statute, because the land was not made more valuable thereby.

"Again it is urged that . . . the lienor's only service was to a chattel which was to be placed upon the land. These facts are insufficient to defeat the lienor's claim. It is not the duty of the court to weigh the relative advantage to the fee owner of each structure erected.

"It is entirely possible that through mistakes in judgment it may happen that there are erected buildings which it would have been better not to build. However, the materialmen and other lienors who furnish material and services for the erection of these structures are not charged with another's mistake in judgment. It is apparent that if the work is an addition to the real estate that it must, for the purpose of the mechanic's lien law, be considered an improvement thereon.

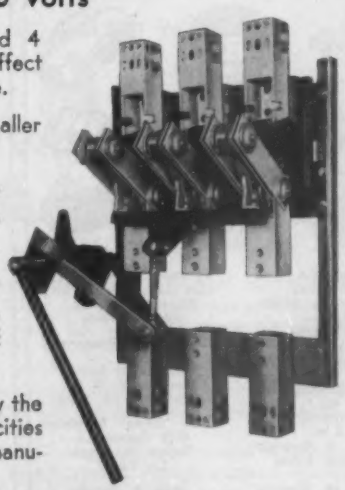
"It is important to note that the placing of the diner was not only 'in accordance with' the lease agreement in this case but the construction of the service building was also in accordance with the agreement."

Section 84.03(2), Florida Statutes, provides in part as follows:

the KAM-LOK SWITCH **With pressure contacts**

1200-6000A 250 and 480 volts

- Hollow terminals, twin jaws and 4 blades per pole give less skin effect heating and more cooling surface.
- Switch is more compact for smaller switchboard dimensions.
- Contact pressure mechanism has no springs, solder or cotter pins. Self-locking in closed position.
- Standard fuse mountings accommodate Amp-Trap 208 or 480, Bussmann KRP or KTX and G-E C-L-F fuses.



The KAM-LOK Switch is accepted by the Electrical Inspectors of most major cities in the south and by switchboard manufacturers serving that area.

SALES REPRESENTATIVES THROUGHOUT THE SOUTH
ATLANTA — Edgar E. Dawes & Co., 405 Rhodes Bldg.
(Also Birmingham, Greenville, Tampa, Jacksonville, Cleveland, Tenn.)
DALLAS — Wynne Snoots Co., 2nd Unit Santa Fe Bldg.
(Also Houston, Little Rock, Oklahoma City, Lubbock)
NEW ORLEANS — Associated Manufacturers Agents, 900 Carondelet St.
RICHMOND — Robert W. Fishburne, 1725 Arlington Road (Also Raleigh)
WASHINGTON, D. C. — Rumsey Electric Co., 317 Southern Bldg.

THE KELEK [k] COMPANY
259 DAVIS AVE. NORWOOD, MASS.

Puzzled
about TIME SWITCHES?

ANSWER:
***specify* PARAGON!**

See your authorized PARAGON distributor. He carries a complete stock of PARAGON Time Controls, and is able to offer you technical assistance on any application problem. Call now and find out!

TIME IS MONEY...CONTROL IT WITH PARAGON

PARAGON
ELECTRIC COMPANY
1618 Twelfth Street, Two Rivers, Wisconsin

ELLIOTT'S COMPLETE LINE
OF CONDUIT FITTINGS

Fay Shaw Co., Inc. (Florida)
Clearwater 3-7008
Miami
HI 8-6760
Jacksonville
EVergreen 8-5456

Berry-Elsberry Co., Inc.
47 Alabama St., S.W.
Atlanta 3, Georgia
JAckson 2-2563

Arthur H. Swartz
2120 Polk Ave.
Houston 3, Texas
CApitol 8-6646

Arthur C. Hoey, Jr.
3344 Cedar Grove Rd.
Richmond 35, Va.
BRidge 2-3449

G. M. (Gus) Hogshead Co.
320 Lincoln Street
Charlotte 3, N. C.
FR 5-5924 - ED 2-5617

V. E. "Gene" Stephens
4112 Commerce
Dallas 26, Texas
TA 7-0867

John J. Rosche
30 E. 25th Street
Baltimore 18, Maryland
BE 5-2882

ELLIOTT ELECTRIC MANUFACTURING CORP.
50-30 98th St.,
Corona 68, New York, N. Y.
Telephone: TWining 8-6688
Write For Complete Catalog
Or Contact Above Agents

" . . . When an improvement is made by a lessee, in accordance with a contract between such lessee and his lessor, liens shall extend also to the interest of such lessor."

Basic impulse levels

(Continued from page 82)

quency sparkover is 15 per cent. One lightning arrester manufacturer states that the maximum value shown as the switching surge sparkover voltage is the maximum value tested on any production line model; the actual sparkover voltage for a large per cent of arresters is somewhat lower.

In short, no arrester coming off the line would test higher than the voltage shown in the table. If this is true, then some consideration could be given to reducing the above margin.

Protection against overvoltages originating outside a substation is provided to a degree by large capacitor banks connected to the HV bus, HV cables, and lines in a multiple station. Capacitor banks and cables can also contribute to overvoltage conditions; however, with modern circuit breakers this is minimized.

A capacitor bank will materially slope off a steep front wave as well as limit its crest; since it is not always connected to the bus, it cannot be relied upon as a surge protector. It is difficult to assign an exact figure to the amount of protection provided by these items, but it can be accepted as an added factor of safety.

In view of the many excellent papers on reduced BIL's, this paper has made no attempt to add to this data, but merely to review some of the facts. It is evident that the BIL levels established in 1941 are now obsolete for system voltage of 115 kv and above. Also, the practice of reducing BIL in steps invites thorough study; it has been proposed that reduced insulation be described of per cent of full insulation.

A more meaningful method might be to specify BIL's required in terms of full voltage, 80 and 75 per cent arresters, or what is even more simple, specify the actual BIL required as dictated by available surge protection equipment.

As voltages go higher, economics will force BIL reduction to minimum safe levels. Ultimate reductions will result in a thorough understanding of switching surge phenomenon.

Two avenues of progress appear possible: one—reduction of switching surge magnitude by use of resistors in circuit breakers and disconnecting switches; two—further improvements in lightning arresters.

References

(1) "Arresters on H-V Stations," Breuer, Hopkinson, Johnson, Schultz—AIEE Transaction Paper 60-250.

(2) "Lightning Protection of Multiline Substation," Clayton, Young — AIEE Transaction Paper 60-249.

(3) "Dielectric Tests as Influenced by BIL Reductions," Meador, Dillow—AIEE Transaction Paper 60-80.

(4) "Switching Surges on Transformer-Terminated Line," Johnson, Schultz—AIEE Transaction Paper 60-92.

(5) "Insulation Coordination of Circuit Breaker," Streater, Wilson—AIEE Transaction Paper 60-205.

(6) "Further Consideration on Reduced Transformer Insulation Levels," Meador. AIEE Conference Paper 58-364.

(7) Dielectric Tests on Large High Voltage Transformers," Meador. Cigre, 1960, Paper No. 110.

13.8-kv switchgear

(Continued from page 84)

filled bus joint covers, spacious rear area for primary cable make-up, flexibility of arrangement, and complete front accessibility for secondary wiring simplify all maintenance.

Extremely fast contact closing, provided by the stored-energy closing principle, has been incorporated into the new 13.8-kv breakers to improve contact life and afford greater safety.

Closing power is stored in the spring mechanism and one closing operation is automatically available even after control voltage is lost. Constant closing force is also assured and springs can be charged manually for emergency closing.

Control power requirements have been cut — to about one-tenth of the current required by other types of systems. Control voltage can be supplied from any normal lighting circuit—such as 115 or 230 volts a-c, or from a 48- to 250- volt d-c supply.

Face-wound coils provide very significant advantages. These coils produce a high-flux-density, uniformly distributed, in-phase field which pulls arcs up into chutes faster — cutting interruption times, increasing contact life, and reducing erosion of chutes. The arc chute shell is made of a specially-developed, flame-retardant, track-resistant polyester glass molding.

The result is far less deterioration of the entire interrupter system, and smaller, lighter arc chutes. The chutes of the 250-mva unit can be tilted easily for contact inspection and maintenance,

they snap off easily, and can be carried by only one man. Only two men are required for similar work on the other three interrupting ratings in the line.

Included in the interrupter system is an improved, wide-nozzle type pneumatic puffer-buffer system. It uses one operating mechanism with three nozzles, to provide equally fast, efficient interruption on low-current openings as is inherent on high-current openings. The system also acts as a buffer to lessen shocks occurring during contact openings.

The new breaker and switchgear arrangement affords closed-door drawout from connected to test and disconnected positions. Breakers can be stored in their compartments in any position and can be padlocked in test and disconnect positions with doors closed. Without opening compartment doors, breaker position can be observed through the sliding panel located just above the floor.

For maximum safety, a two-way interlocking system is employed during breaker drawout. Breakers must be tripped before the racking release lever can be turned and this release lever must be lifted before the racking screw can be turned to move the breaker. The racking screw gives automatic, positive locking in every position. In addition, the circuit breaker cannot be closed between positions.

Meter construction

(Continued from page 79)

Some apply it to both sides of the metal strip, but when it is applied to only one side it can be used in such a way that no adhesive material adheres to the disk.

These statements are not intended as a reflection on meter manufacturers or a reflection on the products which they produce. Our meters, along with materials and construction methods, have improved greatly over the years.

Manufacturers are due a lot of consideration and praise for their efforts to produce the best possible meter at the lowest possible price, even though competition today makes any other recourse rather impractical.

Most manufacturers will agree, however, that many improvements are brought about as a direct result of consumer suggestions. If the merchandise has a fault some users will find it, and most of them will express their opinion on the flaw. Instead of resenting these criticisms, however, the manufacturers welcome them. How else can they know whether they are doing a good job in the eyes of the customer.

And, perhaps, some design engineer may devise a method of sheathing the damping magnets of watthour meters in an enclosure without altering their braking properties on the meter disk; and yet make them invulnerable to the effects of iron.

Four transformers

(Continued from page 78)

partment are baffled to prevent entrance of wires or other similar objects.

Designed for Gold Medallion homes, the unit residential package yields better voltage regulation due to lack of need for secondary runs, and includes ventilated high-voltage circuits which are completely metal-enclosed and only accessible to utility servicemen.

Trial installations of approximately 100 units are anticipated to be delivered during the coming year to selected customers for new housing developments that will use underground electrical service.

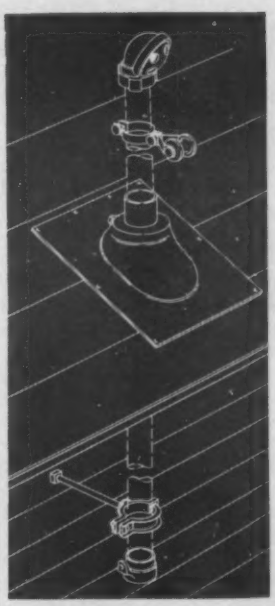
Department officials expect that the combination of further research and development and the operating experience gained by cooperating utilities from the trial installations will bring about a design that can be marketed at competitive price levels.

Pending the results from such joint efforts, there are no plans presently for making the new encapsulated transformer design commercially available.

As mentioned, the encapsulated transformer retains the full dielectric strength of conventional oil-filled construction. This is accomplished by impregnating on the high-voltage winding with a small amount of oil (less than one pint of oil in a 25-kva unit, rather than 15 or more gallons required for a conventional oil-filled transformer).

Special techniques for vacuum treating and oil impregnating the high-voltage winding after encapsulation have been successfully completed. Omission of the tank oil and bushings results in a large reduction in size and weight. The 25-kva unit weighs only 340 pounds (26 per cent less than its oil-filled counterpart).

The encapsulated unit occupies



Make installations fast, built to last with

M&W SERVICE ENTRANCE MAST KITS

Now, you can have exactly the right fittings for any mast installation...quickly...at lower cost. Just select the M&W Mast Kit to fit your needs. Varied assortments for 1¼", 1½", 2" or 2½" sizes, split-clamp or pipe strap conduit support, make it easy for you to pick the one kit that best suits your requirements. Best of all, M&W Kits cost less than individual fittings.

Kits include all necessary parts for mast installation as illustrated, except conduit. Fittings available separately.

New Catalog 59 gives details and prices on complete line of electrical fittings. Write for your copy today.

M&W Electrical Fittings
The M. & W. ELECTRIC MFG. CO., Inc.
EAST PALESTINE, OHIO

a floor space approximately 13 inches by 18 inches, which is 57 per cent less and has a height of 27 inches, which is 34 per cent less than its corresponding oil-filled contemporary.

No cellulosic insulating materials are used in this design, all solid materials are capable of working well above Class A temperature limits and in this special environment, and the oil also operates satisfactorily even though the temperatures are well above Class A limits.

The encapsulation is accomplished using a specially developed epoxy resin formulation with the epoxy material being filled with finely divided silica. This provides the great increase in heat transfer characteristics necessary for encapsulation of a unit as large as 25 kva.

This special silica-filled epoxy also provides a good match of the thermal expansion co-efficient with that of the other components of the encapsulated transformer. The resin is tough and resilient and is flexible at the higher operating temperatures to accommodate the volumetric expansion of the rest of the assembly, including the small amount of oil in the high-voltage winding.

The encapsulation bonds the coil assembly into a solid unit with mechanical strength more than adequate to withstand the forces resulting from full short circuits, so that from a short circuit strength standpoint, the transformer is self protecting.

Heat transfer is aided by air ducts through the coil structure and the design of the core itself also helps to radiate heat generated in the windings.

Thorough laboratory tests under a wide variety of conditions have indicated that the encapsulated transformer should perform well in service. However, General Electric has learned from experience that field trials are necessary in any radical departure from established conventional methods and designs.

The current status of the encapsulated design makes it a natural for installation in a compartment, or some other such location, where it is shielded from direct exposure to the weather.

Therefore, it has been proposed that field trial units be integrated into a compartment in, on, or near the attached garage of a utility company's customer's residence. The company is in the midst of arrangements for the construction of a trial lot for field installation. These units will be in the 15- and 25-kva ratings and primary voltages up to 13,200 GrdY/7,620.

For the initial trial installation, the compartment, in addition to housing the transformer, could house high-voltage disconnects and support the kwh meters, if desirable. Under normal circumstances, the primary high-voltage cable would be underground and would enter the compartment from below, through rigid conduit.

Also, for this application in which the transformer necessarily serves a single residential customer, it is a natural to use the customer's service entrance breaker as the transformer's secondary protection against faults on the load circuit.

This allows the service entrance equipment to serve two purposes and puts the control of the transformer secondary protection in the hands of the residential customer; that is, if the customer is aware of the trouble causing the breaker to trip, he could remove the cause and reclose the breaker, making a utility service trip unnecessary.

SNAP!
THEY STAY ON.....
All VICTOR "MAGIC" CLAMPS and STRAPS for Thin and Heavy Wall Conduits have this time-saving snap-on feature.
Contractors everywhere are switching to VICTOR. Cash in on this heavy demand. Add these fast selling, profitable Clamps and Straps to your line.
Write for the new Victor Strap Catalog. Lists over 600 items to fasten Wire, Cable, Tubing and Conduit.
VICTOR
VICTOR SPECIALTIES, INC.
775 MAIN ST., NEW ROCHELLE, N.Y.
The Greatest Single Source for Clamps and Straps
Southeastern Representatives:
HOPPER & McCOY
870 Northside Drive, N.W.
Atlanta, Georgia
Phone: TRinity 2-5803
JAMES & ASSOCIATES
7545 Northwest 26th Ave.
Miami, Florida
Phone: Oxford 6-0611

Ballast relocated

(Continued from page 56)

in a section of four-by-four duct with 1/16-inch asbestos in back of it to avoid any fire hazard, and wired it back to the fixture.

The customer waited for some time before paying his bill, to make certain this method was going to be satisfactory. It was, because he paid his bill and we have had no complaints from him, or any of the other customers for whom we have done this service since.

Indoor Comfort, Inc.

(Continued from page 47)

prospects that I probably will close almost immediately. Personal sales contacts did all this."

Mr. Plant welcomes the sales and technical help offered by the master electrical engineer of the Arkansas Power & Light Co. The power company is especially helpful in preparing finished sketches that can be shown to the customer for sales purposes.

Mr. Plant makes all of his own wiring layouts, approaching every job with complete confidence.

"A contractor just starting in electrical heating needn't hesitate to make the plunge," he insists. "Self-confidence comes fast. When I approach a heating job now, I feel sure that I'll make a satisfactory profit and please the customer permanently."

A customer who has enjoyed his electrically heated home for a year or two turns into a powerful salesman for this contractor. When Mr. Plant sits down with a prospect and tells him electrical baseboard heat, with its individual thermostat controls, provides even heat from floor to ceiling, the prospect listens attentively.

When a homeowner who has used the heat for a season or two demonstrates the cozy results proudly, the prospect is half sold.

Mr. Plant also emphasizes economy in his sales talks. He even convinces the prospect that many dollars are saved each year in house-cleaning expense and in interior decorating because electrical heat is clean.

His enthusiasm for electrical heating, supported by the name under which he operates and the impressive advertising, had spectacular sales results this past year. Indoor Comfort, Inc., installed 40 per cent of the electrical heating and air conditioning for Pulaski County during 1960.

Although much of this volume was for residences, a significant portion of it represented industrial and commercial installations. One of the most attractive jobs completed recently was the 33-unit Townhouse Motel, at Conway. Here one of the electrical features is infrared electrical heat for the baths. This attracted the attention of many prospective builders, several of whom have already inquired about infrared heating units.

On all electrical contracting jobs, the name of the contractor is prominently displayed on a sign — Indoor Comfort, Inc. Whether the job is wiring, plumbing, air conditioning, or kitchens, the name is played up.

Contractors are wooed steadily through personal contact and advertising. Although Indoor Comfort, Inc., has been operating only a year as a one-stop service center, 500 general contractors throughout the state have done business here. Some of this volume is easily traced to builders who have been attracted by the advertising.

The main problem that Mr. Plant has encountered is the difficulty of securing trained electricians. He has six good men on his payroll, but needs more journeymen to train to be master electricians.

"A good electrician is trained on the job," he insists. "He can't get the know-how in school. I'd like to see more journeymen available for additional on-the-job training, which I am eager to give the right men. It's the way I learned, working for several years under a well-known electrical contractor before I struck out for myself, 12 years ago."

Mr. Plant has set up some unusually good rules for making his electricians happy on the job and eager to help him sell all-electrical living. His men receive vacation pay and pay for all holidays. In the summer a fishing party is given for them, with all expenses paid by the company.

Good equipment and trucks also help to hold men, Mr. Plant pointed out. He supplies a number of labor-saving electrical devices. The four trucks he uses regularly are part of the efficient Indoor Comfort, Inc., fleet.

The appearance and the physical features of the new building also help to make personnel happy, and please customers, too.

Customers who call in person enter a reception room that is handsomely furnished with tables and brightly upholstered chairs. There are magazines to read. An intercommunication system extending throughout the large building impresses the waiting person with good service.

This atmosphere of comfort and success helps to make the builder want the joy of all-electrical living, Mr. Plant believes.

Code application

(Continued from page 61)

or flyings are stored or where they are handled except during the process of manufacture.

Articles 501, 502, and 503 of the Code specify the types of wiring and equipment which are required in Classes I, II, and III locations respectively in both Divisions 1 and 2.

Therefore, after determining what class and division an area is in by the provisions of Article 500, the type of wiring and equipment required in the area can then be determined by consulting the provisions of Article 501, 502, or 503 depending on which class it happens to be.

For instance, suppose a mill where flour is made is found to have combustible dusts in suspension in the air during normal operating periods in quantities sufficient to produce explosive or ignitible mixtures.

By the provisions of Section 500-5 of Article 500, it is determined that this is a Class II, Division 1 location. It is then necessary to determine what the requirements are for wiring and equipment in such Class II, Division 1 locations. Hence, Article 502—for Class II installations—is searched for this information.

First, we usually want to know what wiring methods are required or permitted. If so, we glance through the various headings until we come to "Wiring Methods." This is found in Section 502-4, and Division 1 requirements are covered in Paragraph (a) of this section.

Sealing requirements are covered in Section 502-5. In this case, the requirements are the same for Divisions 1 and 2. Requirements for motors may be found in Section 502-8, and for lighting fixtures in Section 502-11, etc. In this fashion, it is possible to look up all the various equipment, such as switches, heaters, transformers,

For Consistent High Quality and the Utmost in Performance

ASK FOR

AMERICAN *Bonded* ARMORED CABLE

For the life-line of your electrical installations, there's no better choice than American Bonded! It's the favorite of electricians, contractors and engineers, the nation over. That's because of American Bonded's reputation for quality, handling ease and performance . . . a reputation unmatched anywhere! Whenever you're using armored cable, be sure with the best . . . American Bonded!

AMERICAN METAL MOULDING CO.

146 COIT ST. IRVINGTON 11, NEW JERSEY

Atlanta Warehouse: C. C. MYRICK, 516 Elm St., N. W., Atlanta, Georgia

OUTPERFORMS ALL OTHER BRUSHES ON HIGHEST SPEED EQUIPMENT

HELWIG
RED TOP
CARBON BRUSHES

Long lasting Red Tops perform better than original equipment brushes on highest speed motors and generators. Better commutation under extreme load conditions.

FREE SURVEY

. . . of your equipment by our field trained engineers. Write today. There's no obligation.

HELWIG CARBON PRODUCTS, INC.
2536 North 30th Street, Milwaukee 10, Wisconsin

Full HOUSEPOWER
FUSIBLE OR NON-INTERCHANGEABLE E-Z-RED CIRCUIT BREAKERS
For AIR-CONDITIONING HEAT RANGE LIGHTS DRYER ETC.

SERVICE EQUIP. INDUSTRIAL SWS. PANEL BOARDS WIRING TROUGHS

The WADSWORTH Electric MFG. CO. INC.
COVINGTON KENTUCKY
WRITE FOR FREE CATALOG

etc., which it is desired to install in any given location. The type of equipment required by the Code in each case is thus determined.

It is very confusing just to read Article 501, 502, or 503 unless particular attention is paid to the headings and to the general plan of these articles. Without such attention to the basic approach used, confusion is caused by the repetition of the class and division sub-headings.

But as indicated by the flour mill example given above, the wiring method and each type of permitted equipment is given its own heading. This is followed in each case by sub-headings which discuss the different phases of the main subject heading, first as applied to Division 1 and then as applied to Division 2.

Sometimes Divisions 1 and 2 have the same requirements, in which case they are lumped together in one sub-heading. Sometimes some of their requirements are different and some are the same, in which case there are three sub-headings dealing first with the requirements of Division 1, next with the requirements of Division 2, and finally with the requirements which are common to both.

Sub-headings frequently are divided further into two or more numbered paragraphs. But in all cases, the general plan is the same.

For instance, in Article 501, for Class I installations, the requirements for sealing are set forth under the basic section heading: Section 501-5. Sealing. Under this general heading there is an explanatory paragraph, general in nature, which is followed by three sub-headings (a), (b), and (c).

The first of these sub-divisions, Paragraph (a), is concerned solely with sealing requirements in Division 1 locations. It is divided further into three numbered paragraphs (1), (2), and (3) which cover different phases of Division 1 requirements for sealing.

This is followed by Paragraph (b) which covers requirements for Division 2 locations; and, like Paragraph (a), Paragraph (b) is also divided further into numbered paragraphs, (1) and (2).

Finally, there follows Paragraph (c) which concerns sealing requirements which are common to both divisions. Like the others, it, too, is divided further into numbered paragraphs (1) through (7).

It will be remembered, of course, that all of the whole subject of sealing as covered by the entire heading of Section 501-5, together with its sub-headings and sub-sub-headings, refers only to sealing requirements in Class I locations. Class II and Class III installations are similarly treated in Articles 502 and 503 respectively.

The details of these various articles will be discussed in the next issue.

Answers to Code test questions: (1. **T** Section 500-4) (2. **T** Section 500-4-a) (3. **F** Section 500-4-a) (4. **F** Section 500-4-b) (5. **T** Section 500-4-b and fine print note) (6. **a** Section 500-4-b and fine print note) (7. **b** Section 500-5) (8. **b** Sections 500-4-a and 500-5-a and 500-6-a) (9. **c** Section 500-5-a) (10. **a** Section 500-6-a).

Printing plant

(Continued from page 45)

from the four infrared lamps.

The flexible conduit in the arms permitted raising or lowering the lamps to positions where heat was needed. The need was answered entirely to the customer's satisfaction.

Emergency lighting wired on a separate circuit was incorporated into the general lighting system.

The entire moving operation was accomplished in three days.

Tape record it

(Continued from page 43)

dered and items requiring correction. In frigid winter weather, when you have to remove gloves to use a pencil, it is a real convenience.

When interviewing job applicants, the recorder provides the ideal method for a direct, unprejudiced comparison of the various men, their character, poise, and knowledge. Differences are immediately apparent and decisions can be made by management, even though all interested parties could not be present during the actual interviews.

At the end of the year the tape machine will cut the time required for inventory in half. All items are counted and noted on the recorder, which is then carried back to the desk where the information is transcribed into the inventory book. Of course, there is the obvious use of the recorder as an electronic secretary. The tape recorder is always with you, even in your car.

One day's trial will prove the facts. Try a portable tape recorder once and you will wonder how you have managed without it.

Quartz iodine lamps

(Continued from page 50)

personnel at Southern Electric Company in Charleston sensed this. There was a budget, of course. Light that would not disappear into the asphalt surface was the first need. It was necessary to maintain more than two footcandles properly distributed and shielded.

In selecting the recently developed 500-watt quartz iodine lamps for the job, John Disher, of Southern Electric, was able to achieve the basic requirements. In addition, the store owners were highly pleased with the results. Many had expressed concern that the lighting would "wash out" their individual store front display and lighting themes. Some expressed objections to hiding behind a jungle of silvered standards during daylight hours.

Color rendition from the quartz iodine lamps is excellent, and by using unobtrusive standards, the architectural design of the center was not obscured from the highway. By taking advantage of the sharp top cut-off, the beam was aimed to avoid clash.

South Carolina Electric and Gas Company had installed mercury whiteway lighting on four-lane Folly Beach Rd., which passes in front of the shopping center. Where the road curves, the embankment rises about four feet above the parking lot level. To avoid serious distraction to drivers approaching, Mr. Disher chose to install a low level system. The units were mounted at 22 feet above the parking lot pavement.

By using incandescent fixtures, he was able to contrast the color with the blue-white traffic lanes. This proved most satisfactory, and eliminated distortion and the possibility of accidents.

By directing the top of the beam from those units mounted on the side of the parking lot near the road to well below the line of vision of motorists, no glare was spilled on the highway. Using the bottom cut-off, units were set to give maximum beam utilization. A rule-of-thumb distance of this line from the base of the pole can be worked out for intensities desired.

Loss of efficiency, a serious problem with some sources of lighting, practically does not exist in the quartz unit if it is properly enclosed. The 500-watt lamp produces 10,500 lumens right up to the end of lamp life. This end comes rather violently, and unless the lamp is properly fused, the tube will rupture.

To protect against untimely lamp failure, the unit is totally enclosed within a heat and impact resistant lens. As the lamp must burn within four degrees of horizontal, a leveling instrument was put on each unit for final setting.

Pole locations were determined by access to existing underground circuits. Tapered steel standards were fabricated to Southern Electric's specifications. Near the base an FDA Unilet with weatherproof heavy duty receptacle was tapped into the casing so that seasonal decorations can be installed and lighted. This separate outlet can also be used for numerous other requirements, such as the portable displays used at many shopping centers.

Another successful application of the 500-watt quartz iodine lamp was made in a miniature golf course. Using 13 units mounted 20 feet from the turf, Southern Electric achieved highly satisfactory results.

The course is done in brilliant colors, and proper color rendition was essential. Due to the shape of the layout, larger floodlights would have been uneconomical. Because of insects, closer canopy lighting would have made play uncomfortable in the summer.

Because the light weighs only three pounds and needs no auxiliary equipment, clusters can be mounted on small standards. The compact size minimizes wind resistance.

Motel lighting

(Continued from page 42)

three sides with glass—except for the slender brick columns, features recessed fixtures, a pendant cluster of three lights over a lush planter in circular brick, and bracket lights against the inside of the brick columns.

Five 15-watt floods at the base of an outside office wall, Mr. Krueger pointed out, make an interesting nightime composition of an artistic concrete arrangement of circles, squares, and triangles.

The same style brackets used in the restaurant and the office are placed on the exterior of the motel units, midway between entrances. These brackets are double lights, with a 60-watt in the lower unit,

Before you buy . . .

COMPARE*

BLACKHAWK SERVICE ENTRANCE MAST

builds your reputation for quality and service

Check these fittings against any others on the market.

Slip-fitter service entrance head — Just slip it on over conduit and tighten two set screws. That's all. Made of corrosion-resistant aluminum. Available in a full range of sizes.

Insulators — Reinforced, durable, well-rounded porcelain secured to metal pipe mounting clamp, galvanized pull-off fitting available uninsulated.

Flexible Synroflashing — Made of flexible neoprene to absorb vibration. Mast can't work loose, damage shingles or cause leaks. Won't rot, peel or crack in any weather. Available for 1¼, 1½, 2, 2½ and 3" pipe.

MOUNTING BRACKETS — New combination bracket accommodates 1¼, 1½, 2, 2½, and 3" pipe. Available with ½" thru bolts or with lag screws.

OFFSET REDUCER — Corrosion-resistant aluminum alloy. Fits 1¼" and 1½" hubs to a 2" or 2½" pipe riser and 2" hub to 3" pipe riser.

Available as a complete kit or as separate fittings.

Blackhawk Industries

Where the new ideas come from

DUBUQUE, IOWA

a 40-watt in the upper. They give ample light at the entrance and are yet far enough from the door to minimize the occasional insect problem.

And the night insect problem was indirectly responsible for one of the pleasing lighting features of the motel, manager P. W. Forbes pointed out.

Suntide was opened in August 1960, and the bracket lights on the units were attracting some bugs. Yellow bulbs were installed to lessen this affinity, and while the lighting became less attractive to bugs, it proved just the soft visual touch needed to bring the layout into a pleasing harmony.

Lighting carries its full load in adding to the lush atmosphere of the interior of the units.

A cluster of three 60-watt lights is turned on by the switch at the door, with all other lights having separate switches at the fixture. Over the vanity, six 40-watts are used in a perforated metal fixture; in the bath, four 40-watts are used in a similar fixture. Individual hanging pendants are used over the head of each bed.

Manager Forbes pointed out that each room has TV, radio, hi-fi; and each room has its own control for central heating and cooling. In other special touches, rooms have an easy chair for each occupant, plus additional chairs.

All other furniture is wall-hung, and walls are either pink, green, or beige pastels combined with paneling. In order to get wool carpet of the same type throughout which would blend with each shade of room, arrangements were made with the carpet mill to manufacture special carpet combining those three colors for the 75 units.

The pledge of quality made by the lighting job at Suntide is met in all accommodations for guests. And the management believes lighting is a strong factor in Suntide's success, both in attracting the guest and making his stay an enjoyable one.

All-electric house

(Continued from page 49)

so made easier by electric motors which power a mower, an edger, and a hedge trimmer. Also on the patio is a hose connection of the central vacuum system.

There are 14 motor-powered tools in the home workshop, which also houses a museum of small motors including representative models of early fractional horsepower motors.

In addition to the wide use of motors in this ultra modern home, many other electrical devices are utilized for greater living comfort. Special fluorescent ballasts permit dimming or brightening of the living room lighting. This variable lighting is typical of the years-ahead features which make this home so unusual.

Prophetically, the wiring was planned to carry a much heavier load than even the 100 motors and other electrical equipment will demand. As an example of being ready for new electrical equipment and features, the home contains well over twice as many electrical outlets and double-base plugs as the average home of its size.

And a special power distribution center was installed during construction to permit changes in load capacity over its quantity of circuits and different voltages.

Heating is all electric with radiant coils built into the ceiling and cables laid below the sliding glass doors and full length windows which form a "U" around the patio.

Contractor for the unusual home was Jack Worthman of Fort Wayne. The Indiana-Michigan Electric Company supplies the power and was consulted frequently during the construction phase.

Washington report

(Continued from page 10)

union officers to talk over job jurisdiction difficulties and possible solutions.

The work stoppage occurred the last two weeks of November at Cape Canaveral, Fla.

On the committee's recommendation, a labor relations specialist for the first time has been appointed to work with the Saturn program.

The committee also recommended that in the future, before striking, " . . . the local union notify its national headquarters and give it opportunity to work further on the matter."

Frank W. Graham, assistant to the international president, IBEW, was one of the committee members.

The two unions struck because government technicians, instead of their members, were connecting the firing console building to the missile pad. The unions claimed that this work was within their jurisdiction at Cape Canaveral. They feared job losses.

The von Braun team explained to the committee (but apparently failed to explain to the unions) that as experience was gained and job specifications were written, the work would be assigned to contractors (including electrical contractors) but the hook-up of the console to the pad was now experimental.

To prevent such misunderstandings in the future, the committee recommended: appointment of a government labor relations director for the Saturn program (which was done immediately); pre-job conferences between contractors, the unions, and the von Braun space team; more contracting out by the von Braun team; and better efforts by the unions to work out problems before striking.

Economic comment

(Continued from page 6)

Anything which tends to make people wary of spending their money or investing in productive enterprise can do little else than worsen the situation.

This is a lesson yet to be learned among the new leaders in the nation's Capitol.

CLASSIFIED

WAREHOUSE
in Jackson, Mississippi

Agency serving wholesalers in Miss., La., and Ark., with warehouse in downtown Jackson, Miss., wants additional lines to supplement present lines of fluorescent lighting, boxes, water heaters, built-in appliances. **FACTORY DISPLAY & WAREHOUSE CO.**, Hartwell Cook, Sales Representative, 1237 Vine St. at Hollywood, P. O. Box 514, Jackson, Mississippi. Dial FL-2-0065.

SAVE! SAVE! SAVE!

Buy accurate, dependable, rebuilt WATTHOUR METERS for any electric service, and buy for less! Also repair and recalibration service. HIALEAH METER CO., Dept. ES, 829 E. 25th Street, Hialeah, Florida

For direct factory representation, contact Ralph Y. Morgan (2501 Columbia Drive, Decatur, Georgia; BUtler 9-3234). Available now. Formerly Division Manager for Economy Fuse & Manufacturing Company, supervising sales in 9 Southeastern states. Has wide contacts, with Distributors, Contractors and Users.

MANUFACTURERS' AGENTS

REPRESENTING OUR ADVERTISERS

ACCURATE MFG. CO

Florida, Riverview: Bill Crichton & Assoc.
Georgia, Atlanta: Frank B. Davis
Kansas, Kansas City: R. L. Haizlip Co.
Missouri, St. Louis: C. J. Sampson & Son
North Carolina, Charlotte: W. H. Lassiter Sales Co.
Tennessee, Memphis: K. L. Wahlstrom
Texas, Dallas: W. H. "Jack" McAdams Co.
Texas, El Paso: R. L. Brewer Co., Inc.

ALLEN-BRADLEY CO.

Alabama, Birmingham: J. L. Howarth Co., Inc.
Arkansas, Little Rock: Curtis H. Stout, Inc.
Florida, Jacksonville: Van & Smith Co., Inc.
Florida, Miami: Charles R. Lee & Assoc., Inc.
Florida, Tampa: Van & Smith Co., Inc.
Georgia, Atlanta: Roy E. Wilson Co.
Kentucky, Louisville: The Rietze Co.
Louisiana, New Orleans: Robbins & Robbins
Louisiana, Shreveport: Curtis H. Stout, Inc.
Maryland, Baltimore: Harry M. Wood & Co., Inc.
Missouri, Kansas City: B. L. McCreary & Son
Missouri, St. Louis: Allen-Bradley Co.
North Carolina, Charlotte: LeRoy P. Spoon
Oklahoma, Oklahoma City: John W. Elder Co.
Oklahoma, Tulsa: John W. Elder Co.
Tennessee, Knoxville: Bowditch & Co.
Tennessee, Memphis: Curtis H. Stout of Tenn., Inc.
Texas, Abilene: A & A Supply Co.
Texas, Dallas: Allen-Bradley Co.
Texas, Houston: Allen-Bradley Co.
Virginia, Richmond: Allen-Bradley Co.
West Virginia, Charleston: Henry E. Payne

ALL-STEEL EQUIPMENT, INC.

Arkansas, Little Rock: Jim Venable
Florida, Miami: James & Assoc.
Georgia, Atlanta: Hopper & McCoy, Inc.
Kentucky, Louisville: R. A. Esterle
Louisiana, New Orleans: Jack Hagan
Maryland, Baltimore: Bloom Assoc.
Missouri, Kansas City: Tom Nulik Co.
Missouri, St. Louis: Ralph Hinchman Co.
North Carolina, Greensboro: Barber-Ayers & Assoc.
Texas, Dallas: Jim Randall Co.

AMERICAN METAL MOULDING CO.

Florida, Miami: Suchman Assoc., Inc.
Georgia, Atlanta: C. C. Myrick, Jr.
Kansas, Wichita: Walter Zimmermann
Missouri, St. Louis: Arbeiter Co.
North Carolina, Raleigh: Allen G. Gill

B & C METAL STAMPING CO.

Florida, Lake Wales: Carter-Moody Agency, Inc.
Georgia, Atlanta: Walter M. Hinson
Louisiana, New Orleans: E. J. Hagan
Maryland, Baltimore: Burg & Ellen, Inc.
Missouri, Kansas City: Fleming & Co.
North Carolina, Charlotte: E. F. Lombardi
Tennessee, Memphis: Lloyd D. Fitts
Texas, Dallas: Harry A. Miller Co.
Virginia, Richmond: Robert W. Fishburne

JASPER BLACKBURN CORP.

Alabama, Birmingham: Belcher & Assoc., Inc.
Alabama, Birmingham: Godfrey W. Glenn
Florida, Jacksonville: Belcher & Assoc., Inc.
Florida, Miami: Belcher & Assoc., Inc.
Florida, St. Petersburg: Belcher & Assoc., Inc.
Georgia, Atlanta: Belcher & Assoc., Inc.
Kansas, Emporia: Glenn A. Watkins
Kentucky, Louisville: Shouse-Reed Co.
Louisiana, New Orleans: Dupont-Bondurant, Inc.
Maryland, Towson: Roy J. Buress
North Carolina, Charlotte: E. F. Lombardi
Tennessee, Memphis: Southland Sales Agents
Tennessee, Nashville: Southland Sales Agents
Texas, Dallas: Curtis Musgrove Co.
Texas, Fort Worth: C. Musgrove Co.
Texas, Houston: C. Musgrove Co.
Texas, San Antonio: C. Musgrove Co.
Virginia, Richmond: Leo A. Roach

BLACKHAWK INDUSTRIES

Florida, Orlando: Ralph B. Shannon Assoc.
Georgia, Atlanta: I. Arnold Hoge Assoc.
Missouri, Independence: J. D. Burns Co.
Tennessee, Memphis: Keith Wahlstrom
Texas, Dallas: Peabody Brothers
Virginia, Richmond: Paul Mayo, Jr.

BODENDIECK TOOL CO.

District of Columbia, Washington: A. H. Baxter
Florida, Miami: Bowen-Arnold Agency
Florida, St. Petersburg: Bowen-Arnold Agency
Georgia, Smyrna: Wayne Johnson Assoc.
Kentucky, Louisville: Shouse-Reed Co.
Louisiana, New Orleans: Dupont-Bondurant, Inc.
Missouri, Kansas City: Williams & McKinley Sales Co.
North Carolina, Cary: Fred B. Woods
Oklahoma, Oklahoma City: R. C. Ramsey Co.
Tennessee, Nashville: John S. Baron
Texas, Waco: Bob Van Valin

BUCHANAN ELECTRICAL PRODUCTS CORP.

Alabama, Birmingham: Belcher & Assoc., Inc.
Florida, Jacksonville: Belcher & Assoc., Inc.
Florida, Miami: Belcher & Assoc., Inc.
Florida, St. Petersburg: Belcher & Assoc., Inc.
Georgia, Atlanta: Belcher & Assoc., Inc.
Maryland, Baltimore: A. D. Wilson
Missouri, Kansas City: Charles L. Arehart
Missouri, Kirkwood: The Ray Martin Co.
North Carolina, Charlotte: Samuel T. Gantt
North Carolina, Charlotte: C. Carroll Niedringhaus
Tennessee, Memphis: Hal Beard, W. L. Clinton & Assoc.
Texas, Fort Worth: J. E. (Bill) Morton, W. L. Clinton & Assoc.
Texas, Houston: W. L. Clinton & Assoc.

CAROL CABLE CO.

Arkansas, Little Rock: Jim Venable & Assoc.
Florida, Tampa: Graham P. Dowling
Georgia, Atlanta: William F. Bishop Co.
Louisiana, New Orleans: Dupont-Bondurant, Inc.
Maryland, Towson: George E. Clements
Missouri, Kansas City: Schooler-Gorman Co.
Missouri, St. Louis: Ralph Drenkhahn
North Carolina, Charlotte: E. F. Lombardi Co.
Tennessee, Nashville: Matthews & Brokaw
Texas, Houston: Fred Walters Co.

CHASE-SHAWMUT CO.

Florida, Miami: John S. McWhorter, Inc.
Georgia, Atlanta: Berry Elsberry Co., Inc.
Louisiana, New Orleans: Paul Hogan, Jr.
Missouri, Kansas City: Tom Nulik, Jr.
Maryland, Baltimore: Specialty Electrical Sales Co.
Missouri, St. Louis: Carlton Cooley
North Carolina, Greensboro: Wilson P. Byrd
Texas, Dallas: Jack Morgan Co., Inc.

DAY-BRITE LIGHTING, INC.

Alabama, Birmingham: James R. Fuller
Florida, Jacksonville: Joseph V. Crevasse
Florida, Miami: James A. Foerster
Georgia, Forest Park: Oren Ruff
Kentucky, Louisville: H. C. King & Assoc.
Louisiana, New Orleans: Paul Hogan, Jr.
Maryland, Silver Spring: George Maloomian
Mississippi, Jackson: James F. Bronson
Missouri, Kansas City: M. H. Burwell Co.
Missouri, St. Louis: E. H. Lauth & Assoc.
North Carolina, Charlotte: Ladd M. Massey
North Carolina, Raleigh: Roy Palmer, Jr.
Oklahoma, Oklahoma City: Paul Sheline
South Carolina, Myrtle Beach: M. Breeden
Tennessee, Knoxville: L. H. Endenfield
Tennessee, Memphis: H. Sidney Chilton, Jr.
Tennessee, Nashville: Joe L. Booker
Texas, Dallas: H. A. Auchter
Texas, Houston: Joe W. Hale
Texas, Lubbock: Stewart O. Norris
Virginia, Richmond: Earl Dagenhardt
Virginia, Roanoke: John C. Manos

CHELSEA FAN & BLOWER CO., INC.

Florida, Tampa: John R. Collins & Assoc.
Georgia, Atlanta: I. Arnold Hoge & Assoc.
Louisiana, New Orleans: E. P. Jones, Jr.
Maryland, Bethesda: Jerry B. Hirsch
Missouri, Kansas City: The Schooler-Gorman Co.
Missouri, St. Louis: Henderson Sales Co.
North Carolina, Charlotte: C. Carroll Niedringhaus
Tennessee, Knoxville: Jim Hash & Co.
Tennessee, Memphis: Malcolm Kueneman
Texas, Houston: Texas Sales Representatives Co.

DUNCAN ELECTRIC CO., INC.

Florida, Clearwater: The David & Park Co.
Georgia, Atlanta: The Gearhart Co.
Kansas, Prairie Village: Owen Hetzler
Kentucky, Louisville: Hy-Line Equipment Co.
Louisiana, Metairie: Gulf Sales Agency
Maryland, Silver Spring: Ernest Hover
Missouri, St. Louis: C. H. Douglas
Missouri, Springfield: Ivan Boggs & Co.
Oklahoma, Tulsa: C. B. Anderson Co.
Tennessee, Knoxville: J. G. Pettyjohn Co.
Tennessee, Memphis: Joe W. Deming
Texas, Abilene: A & A. Supply Co.
Texas, Dallas: W. J. Kerr

ELECTRIC TUBULAR PRODUCTS, INC.

Florida, Miami: Electra, Ben Parker
Georgia, Atlanta: I. Arnold Hoge
Louisiana, New Orleans: Fred C. Baldridge Co.
North Carolina, Charlotte: DK Electric Sales Co.
Tennessee, Knoxville: J. Bill Johnson
Texas, Houston: Brenner Electrical Sales

ELECTRI-FLEX CO.

District of Columbia, Washington: James P. Quick
Florida, Miami: Hopper & James
Georgia, Atlanta: Hopper & McCoy
Missouri, Kansas City: Parkins & Bretz Co.
North Carlonia, Greensboro: Barber-Ayers & Assoc.
Texas, Dallas: Burrus & Matthews
Texas, Houston: Burrus & Matthews
Virginia, Richmond: Lewis J. Crews

MANUFACTURERS' AGENTS

REPRESENTING OUR ADVERTISERS

ELECTROMODE, Div of Commercial Controls Corp.

Florida, Miami: Meyer-Orens Co.
Georgia, Atlanta: Phillip L. Kamerer
Maryland, Baltimore: Frank S. Grott
Missouri, St. Louis: E. G. Sommerlath, Jr.
North Carolina, Charlotte: Robert L. Smith
Oklahoma, Oklahoma City: Mark K. Hartman
Tennessee, Chattanooga: Craig-Owen Co.
Texas, Houston: A. V. Lamb & Co.

ELLIOTT ELECTRIC MFG. CORP.

Florida, Clearwater: Fay-Shaw & Co., Inc.
Florida, Jacksonville: Fay-Shaw & Co., Inc.
Florida, Miami: Fay-Shaw & Co., Inc.
Georgia, Atlanta: Berry-Elsberry Co., Inc.
Maryland, Baltimore: John J. Roche
North Carolina, Charlotte: G. M. Hogshead Co.
Texas, Dallas: V. E. Stephens
Texas, Houston: Arthur H. Swartz
Virginia, Richmond: Arthur C. Hoey, Jr.

EVANS METAL CO.

Georgia, Atlanta: J. J. Perry, Jr.
Texas, Dallas: Harry A. Miller Co.

FANNER MFG. CO.

Alabama, Birmingham: Gene Johnson Co.
Florida, Coral Gables: Anson Fyler Agency
Kentucky, Louisville: Shouse-Reed Co.
Louisiana, Metairie: R. C. Hauk
Missouri, Kansas City: The Charles L. Ward Co.
Missouri, Springfield: Ivan Boggs and Co.
North Carolina, Charlotte: Jake Rudisill Assoc.
Tennessee, Memphis: Southland Sales Agents
Texas, Dallas: L. R. Ward Co.

FISHER-PIERCE CO.

Florida, Miami: Bowen-Arnold Agency
Florida, St. Petersburg: Bowen-Arnold Agency
Georgia, Atlanta: Walter W. Wildeman
Louisiana, New Orleans: Lyman C. Reed, Inc.
Maryland, Silver Spring: H. C. Langmack Co.
Missouri, Kansas City: Williams & McKinley Sales Co.
Missouri, Kirkwood: Williams & McKinley Sales Co.
North Carolina, Charlotte: Glenn & Larson
Oklahoma, Oklahoma City: Mark K. Hartman Co.
Tennessee, Memphis: Lyman Winn
Texas, Dallas: L. R. Ward Co.
Texas, Houston: L. R. Ward Co.

FULLMAN MFG. CO.

Alabama, Birmingham: Cary Chapman & Co.
Florida, Hialeah: Cary Chapman & Co.
Georgia, Atlanta: Cary Chapman & Co.
Louisiana, New Orleans: Cary Chapman & Co.
Maryland, Baltimore: Robert P. Auer
Missouri, Kansas City: Fleming & Co.
Missouri, St. Louis: Fred P. Walter Co.
North Carolina, Greensboro: Cary Chapman & Co.
Texas, Dallas: V. E. Stephens
Texas, Houston: Arthur H. Swartz

G & W ELECTRIC SPECIALTY CO.

Alabama, Birmingham: J. L. Howarth Co., Inc.
Arkansas, Pine Bluff: Gregory-Salisbury & Co. Inc.
District of Columbia, Washington: The Bradley Co., Inc.
Florida, Jacksonville: Van & Smith Co., Inc.
Florida, Miami: Charles R. Lee & Assoc., Inc.
Florida, Tampa: Van & Smith Co., Inc.
Georgia, Atlanta: C. W. Lohner Co.
Louisiana, New Orleans: Electron Equipment Co., Inc.
Missouri, Kansas City: The Charles L. Ward Co.
Missouri, St. Louis: Gordon Karraker
North Carolina, Charlotte: Purser & London, Inc.
Oklahoma, Oklahoma City: The R. C. Ramsey Co.
Tennessee, Knoxville: Claude E. Fox
Tennessee, Memphis: Gregory-Salisbury & Co., Inc.
Texas, Dallas: Elgin B. Robertson
Texas, Houston: Elgin B. Robertson
West Virginia, Charleston: Muller, Harper & Assoc., Inc.

GEDNEY ELECTRIC CO.

Florida, Miami: John S. McWhorter, Inc.
Georgia, Atlanta: C. C. Myrick, Jr.
Kentucky, Covington: H. E. Bracke Co.
Louisiana, St. Francisville: A. H. Magruder
Maryland, Baltimore: J. Vernon Letmate
Missouri, St. Louis: Wood & Anderson
North Carolina, Greensboro: Wilson P. Byrd
Tennessee, Memphis: Lloyd D. Fitts
Texas, Dallas: Jack Morgan Co., Inc.

GLOBE CO.

Alabama, Birmingham: Gene Johnson Co.
Florida, Jacksonville: South East Engineering Co.
Georgia, Atlanta: Ralph S. Cartledge, Jr.
Kansas, Mission: Metals Materials Co.
Kansas, Wichita: D & O Products
Missouri, Clayton: Thomas, Inc.
North Carolina, Charlotte: Mill-Power Supply Co.
Oklahoma, Tulsa: King Metal Products
Tennessee, Knoxville: Southeastern, Inc.
Texas, Dallas: L. R. Ward Steel Products Co.
Virginia, Richmond: Leo A. Roach

HELWIG CARBON PRODUCTS, INC.

Georgia, Atlanta: Carroll and Lloyd Schoen
Kansas, Wichita: W. Zimmerman
Missouri, Olivette: T. J. Skok
Oklahoma, Oklahoma City: John H. Cole
Texas, El Paso: J. E. McCain
Texas, Houston: W. S. McCray

THE KELEK CO.

District of Columbia, Washington: Rumsey Electric Co.
Georgia, Atlanta: Edgar E. Dawes & Co.
Kansas, Kansas City: E. L. Polsinelli Co.
Louisiana, New Orleans: Associated Manufacturers Agents
Missouri, St. Louis: C. O. Leaver Co.
Texas, Dallas: Wynne Snoots Co.
Virginia, Richmond: Robert W. Fishburne

KNOX PORCELAIN CORP.

Kansas, Kansas City: Robert L. Haizlip Co.
Tennessee, Knoxville: A. F. Dougherty
Texas, Dallas: Valkus-Kissel
West Virginia, Parkersburg: Gordon Johnson

KUHLMAN ELECTRIC CO.

Alabama, Birmingham: Godfrey W. Glenn
Arkansas, Little Rock: Curtis H. Stout, Inc.
Florida, Daytona Beach: Hughes Supply, Inc.
Florida, Gainesville: Hughes Supply, Inc.
Florida, Lakeland: Hughes Supply, Inc.
Louisiana, New Orleans: Curtis H. Stout of La., Inc.
Missouri, Kansas City: A. G. Miller
Tennessee, Knoxville: John G. Pettyjohn
Tennessee, Memphis: E. E. Torkell
Texas, Dallas: Curtis Musgrove Co.
Texas, El Paso: Hollis R. Johnson
Virginia, Richmond: Hobson Co.

L & P LIGHTING

Arkansas, Little Rock: N. B. Nichols
Florida, Tampa: Milton L. Fewell
Georgia, Atlanta: D. G. Muir
Kentucky, Mayfield: Arthur Pickens
Louisiana, New Orleans: Associated Manufacturers Agents
Maryland, College Park: Richard B. Murdock
Missouri, St. Louis: Jim Hisserich
Oklahoma, Oklahoma City: Clyde Hammon
South Carolina, Lexington: Gerald Preacher
Tennessee, Chattanooga: Craig-Owen Co.
Tennessee, Memphis: J. E. Clary
Texas, Bellaire: W. K. Carney Co.
Texas, Dallas: Howard E. Johnson
Texas, Houston: Arthur H. Swartz

LACLEDE STEEL CO.

Florida, Miami: Suchman & Associates
Kentucky, Louisville: Phil Evans
Louisiana, New Orleans: I. C. Lyles
Missouri, Kansas City: William B. Terry Organizations, Inc.
Missouri, St. Louis: E. A. Mechler
Tennessee, Memphis: Robert Mild
Tennessee, Memphis: Paul Mueller
Texas, Houston: Bob Roberts Co.

M & W ELECTRIC MFG. CO., INC.

Alabama, Birmingham: W. H. Beaven
Georgia, Pelham: Ben H. Touchstone
Kentucky, Louisville: I. E. Fultz
Louisiana, Metairie: J. D. Sudzik Sales Agency
Missouri, St. Louis: Ajax Electric Sales Co.
North Carolina, Raleigh: Allen G. Gill
Tennessee, Knoxville: C. E. Pitner
Texas, Bellaire: King Sales Co.

MARTIN STAMPING & STOVE CO.

Alabama, Birmingham: Don Treanor
Alabama, Huntsville: Bill Hughey
Tennessee, Chattanooga: Jim Jumper
Tennessee, Memphis: O. N. Fussell

L. E. MASON CO.

Florida, Miami: Hopper & James, Inc.
Georgia, Atlanta: Hopper & McCoy
Maryland, Baltimore: Burg & Ellen, Inc.
Missouri, Kansas City: Schooler-Gorman
Texas, Dallas: Peabody Brothers
Texas, Houston: Peabody Brothers

MEYER MACHINE, INC.

Louisiana, New Orleans: Gregory-Salisbury Co.
Texas, Dallas: Wynne Snoots Co.

MANUFACTURERS' AGENTS

REPRESENTING OUR ADVERTISERS

MOLONEY ELECTRIC CO.

Alabama, Birmingham: Spurgeon-Brown
Florida, St. Petersburg: Engineer Sales Co.
Georgia, Atlanta: Gearhart Co.
Georgia, Atlanta: E. A. Thornwell, Inc.
Louisiana, Baton Rouge: Evans Electrical Supply, Inc.
Louisiana, New Orleans: Evans Electrical Supply, Inc.
Louisiana, Shreveport: Interstate Electric Co. of Shreveport, Inc.
Maryland, Silver Springs: Ernest Hover
Missouri, Springfield: Ivan Boggs & Co.
North Carolina, Charlotte: J. W. Faser & Co.
North Carolina, Raleigh: Engineer Sales Co.
Oklahoma, Grove: W. P. Daugherty Assoc.
Oklahoma, Tulsa: Star Electric Supply Co.
South Carolina, Columbia: Engineer Sales Co. of Carolina
Tennessee, Knoxville: Bowditch & Co.
Tensessee, Memphis: Power Equipment & Engineering Co.
Texas, Abilene: Turner Supply Co.
Texas, Amarillo: Paul Carson
Texas, Beaumont: J. S. Gilfillan Co.
Texas, Corpus Christi: Utility Equipment Co.
Texas, Dallas: Priester Supply Co.
Texas, Dallas: P. J. Scanlon Co.
Texas, Dallas: Watson Electric Supply Co.
Texas, El Paso: Associated Engineers
Texas, Houston: A. C. Krachy Co.
Texas, Longview: Messner Electric Supply Co.
West Virginia, Wheeling: Clayton Engineering Co.

PENN-UNION ELECTRIC CORP.

Florida, St. Petersburg: Bowen-Arnold Agency
Georgia, Atlanta: L. Morris Landers Co.
Louisiana, Metairie: Patton-Gulf Sales Agency, Inc.
Missouri, Kansas City: Tom Nulik Co.
Missouri, St. Louis: Carlton Cooley
North Carolina, Cary: Campbell & Woods Agency
Texas, Dallas: Walter J. Huemmer Co.
Texas, Houston: Walter J. Huemmer Co.
Virginia, Richmond: Campbell & Woods Agency (Dist. Ofc.)

PRECISION MULTIPLE CONTROLS, INC.

Alabama, Birmingham: William H. Neville
Arkansas, Little Rock: Curtis H. Stout, Inc.
District of Columbia, Washington: Allen Avers
Florida, Clearwater: David & Park Co.
Florida, Miami: David & Park Co.
Georgia, Atlanta: Roy E. Wilson Co.
Kentucky, Lexington: Wayne Pederson, Cory, Crum & English
Kentucky, Morganfield: Orville P. Dyer, Cory, Crum & English
Louisiana, New Orleans: Curtis H. Stout, Inc.
Louisiana, Shreveport: Curtis H. Stout, Inc.
Maryland, Baltimore: Frank Butts Assoc.
Mississippi, Jackson: Curtis H. Stout, Inc.
Missouri, Kansas City: Charles L. Ward Co.
Missouri, St. Louis: Fred P. Walter Co.
North Carolina, Charlotte: W. B. Stover
Oklahoma, Oklahoma City: R. C. Ramsey Co.
Tennessee, Knoxville: Everett E. Rule
Tennessee, Memphis: Curtis H. Stout of Tennessee, Inc.
Texas, Dallas: Curtis Musgrove Co.
Texas, Fort Worth: Curtis Musgrove Co.
Texas, Houston: Curtis Musgrove Co.
Texas, San Antonio: Curtis Musgrove Co.

R T & E CORP.

Alabama, Birmingham: Charles W. Ashby Co.
Florida, Orlando: Edward J. Scanlan
Georgia, Doraville (Atlanta): Harold L. Rush
Kentucky, Lexington: J. H. Warrington
Louisiana, Minden: T. J. Hardeman
Mississippi, Clinton: H. E. McCollum
Missouri, Florissant: R. J. Johnson
Missouri, Kansas City: I. C. McLain
Oklahoma, Oklahoma City: E. A. Beatty
South Carolina, Lexington: E. G. Redman
Texas, Dallas: W. M. Dusenberry
Virginia, Arlington: F. D. Johnson

RATTAN MANUFACTURING CO.

Arizona, Pheonix: Abbott Sales Co.
Florida, Miami: Deco Sales Assoc., Inc.
Georgia, Atlanta: George R. Koeln & Co.
Florida, Jacksonville: Harry A. Hoffner
Tennessee, Nashville: Louis Williams & Co.
Tennessee, Nashville: Perry and Barr Co.

REVERE ELECTRIC MFG. CO.

Alabama, Birmingham: Spurgeon-Brown
Florida, Fort Lauderdale: Thomas A. Marshall & Assoc.
Florida, Mount Dora: Ken H. Hill & Assoc.
Georgia, Atlanta: Charles L. Woodyard & Assoc.
Louisiana, New Orleans: Gregory-Salisbury & Co., Inc.
Maryland, Baltimore: Dunlop Lighting
Mississippi, Jackson: Gregory-Salisbury & Co., Inc.
Missouri, Kansas City: Ewert Sales Engineering Co.
Oklahoma, Oklahoma City: Wynne Snoots Co.
Tennessee, Nashville: Factory Sales Agency
Texas, Dallas: Wynne Snoots Co.
Virginia, McLean: Dunlop Lighting

ROYAL ELECTRIC CORP.

Alabama, Birmingham: Cary Chapman & Co.
Arkansas, Little Rock: Mid-South Assoc.
Florida, Miami: Suchman Assoc., Inc.
Georgia, Atlanta: Cary Chapman & Co.
Louisiana, New Orleans: Cary Chapman & Co.
Missouri, Kansas City: L. S. Gershon & Son
North Carolina, Greensboro: Cary Chapman & Co.
Texas, Houston: NuRo Co.

SORGEL ELECTRIC CO.

Florida, Fort Lauderdale: W. Chester Smith
Georgia, Atlanta: Osgood and Assoc.
Kentucky, Covington: H. E. Bracke Co.
Louisiana, New Orleans: W. J. Keller
Maryland, Baltimore: Jerome K. Meyer
Missouri, Kansas City: Fleming and Co.
Missouri, St. Louis: Charles H. Douglas
North Carolina, Greensboro: Max I. Miller
Oklahoma, Oklahoma City: Paul Berry, Inc.
Texas, Corpus Christi: Glidden Engrg. & Equipment Co.
Texas, Dallas: Glidden Engineering & Equipment Co.
Texas, Fort Worth: Glidden Engineering & Equipment Co.
Texas, Houston: Glidden Engineering & Equipment Co.
Virginia, Richmond: Marchant Industrial Sales Co.

SOUTHERN STATES EQUIPMENT CORP.

Florida, Jacksonville: Belcher & Assoc.
Florida, Miami: Belcher & Assoc.
Florida, St. Petersburg: Belcher & Assoc.
Georgia, Atlanta: Belcher & Assoc.
Kentucky, Louisville: Shouse-Reed Co.
Louisiana, New Orleans: Williamson Sales Co.
Louisiana, Baton Rouge: Williamson Sales Co.
Louisiana, Shreveport: Williamson Sales Co.
Mississippi, Jackson: Williamson Sales Co.
Missouri, Kansas City: Williams & McKinley Sales Co.
Missouri, St. Louis: E. S. Waterman
Missouri, Oklahoma City: Williamson Sales Co.
Oklahoma, Tulsa: Williamson Sales Co.
Tennessee, Knoxville: Claude E. Fox
Tennessee, Memphis: Southland Sales Agency
Texas, Amarillo: Williamson Sales Co.
Texas, Beaumont: Williamson Sales Co.
Texas, Corpus Christi: Williamson Sales Co.
Texas, Dallas: Williamson Sales Co.
Texas, Houston: Williamson Sales Co.
Texas, San Antonio: Williamson Sales Co.

STA-BRITE FLUORESCENT MFG. CO.

Arkansas, Little Rock: Jack Green & Co.
Florida, Fort Lauderdale: W. T. Evans Assoc.
Florida, Miami: Bernard Brodsky
Florida, Miami: Leon Witten
Florida, Tampa: Gene Harper
Florida, West Hollywood: Ford Baker
Georgia, Decatur: Kuzell & Co.
Kentucky, Lexington: J. A. Jobert Co.
Louisiana, New Orleans: Weilbaecher & Kennedy
Missouri, St. Louis: Forester Co.
North Carolina, Charlotte: W. W. Hasbrouck Co.
Virginia, Richmond: Electronex Assoc.

TOMIC SALES & ENGINEERING CO.

Florida, Clearwater: Fay-Shaw & Co., Inc.
Florida, Jacksonville: C. Shannon Poppell
Florida, Miami: Fay-Shaw & Co., Inc.
Georgia, Atlanta: Berry-Elsberry Co.
Louisiana, New Orleans: R. J. Lauber-sheimer, Jr.
Maryland, Baltimore: James H. Hale Co.
Missouri, St. Louis: F. Joe Mollerus
North Carolina, Charlotte: C. C. Niedringhaus
Tennessee, Knoxville: C. E. Pitner
Tennessee, Memphis: Jim Clary Co.
Texas, Dallas: Walter J. Huemmer
Virginia, Richmond: L. W. Roberts Co.

TRUCK EQUIPMENT CO.

District of Columbia, Washington: S. J. Meeks' Son
Missouri, St. Louis: Steelweld Equipment Co.
North Carolina, Charlotte: Power Equipment Co.
Tennessee, Memphis: Utilities Equipment Co., Inc.
Texas, Houston: Koenig Iron Works

VICTOR SPECIALTIES, INC.

Florida, Miami: Hopper & James
Georgia, Atlanta: Hopper & McCoy
Louisiana, New Orleans: Al Levin & Assoc.
Maryland, Towson: George E. Clements
North Carolina, Greensboro: Barber-Ayers & Assoc.
Texas, Dallas: Buster Fain & Assoc.

VULCAN ELECTRIC CO.

Georgia, Atlanta: C. H. Cloer & Assoc.
Louisiana, New Orleans: R. G. Titherington
Missouri, Kansas City: Jack M. Gilbert Co.
North Carolina, Charlotte: D. A. Marsden
Texas, Houston: Southwestern Controls, Inc.

WADSWORTH ELECTRIC MFG. CO., INC.

Florida, Clearwater: James F. Graff
Georgia, Atlanta: Robert Hanson
Kansas, Prairie Village: D. W. Phillips
Kentucky, Highland Heights: Fred A. Thoeny
Kentucky, Louisville: Charles Pfeiffer
Louisiana, New Orleans: S. M. Redmann
Maryland, Severna Park: George H. Weitzel
North Carolina, Greensboro: John H. Bowers
Oklahoma, Jenks: Wayne G. Parker
Tennessee, Memphis: S. H. Busang, Jr.
Texas, Houston: Jack Morgan Co.
Texas Houston: Joe M. Sinclair

Elgo Ventilating Specialties

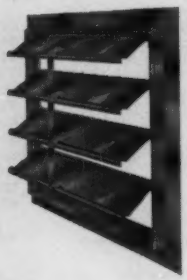
NEW! EXTRUDED ALUMINUM SHUTTERS

With Completely Concealed Pivot Pins

Lightweight . . . Strong . . . Durable

ELGO Shutters Give You All these advantages

- Light Weight
- Full Weather Strip
- Low Freight Cost
- Easier Installation
- Concealed Pivot Pins
- Rust Proof and Corrosion Proof Aluminum
- Natural aluminum finish with fluted frames.



Write for complete specifications

Free Catalog

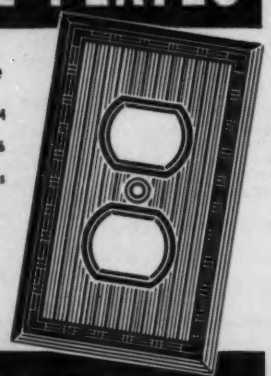
ELGO SHUTTER & MFG. CO.
2738 West Warren Detroit 8, Michigan

MASSEY still making the "old reliable" BAKELITE HEAVY DUTY WALL PLATES

Conventional & Interchangeable

BAKELITE: Brown & Ivory
- Competitive—19 types, up to 4 gang.
- Heavy Duty—22 types, up to 6 gang.
- T. V.—Single and Multi Set Hookups

METAL: Any type. Combinations up to 8 gang.
- Brown & Ivory Wrinkle
- Chrome—Chrome Brass
- Stainless Steel
- Enameled
- Unfinished
- Oil Burner and Air Conditioning
- 040 Brushed Brass



Single and Multi-gang Wall Plates and Electric Wiring Devices.

Send for catalog and prices today

A. H. MASSEY, INC.
P. O. Box 206
DERBY, CONN.

ADVERTISER'S INDEX

A

Accurate Mfg. Co. 123
Alabama Electrical & Electronics Exposition 74
All-Steel Equipment Inc. 19, 20, 21, 22
Allen-Bradley Co. 38
Allis-Chalmers Mfg. Co. 101
American Metal Moulding Co. 131
Anderson Electric Corp. 23
Appleton Electric Co. 36, 37
Arrow-Hart & Hegeman Electric Co. 11, 13

B

B & C Metal Stamping Co. 62
Blackburn Corp., Jasper 91
Blackhawk Industries 133
Bodendieck Tool Co. 75
Buchanan Electrical Products Corp. 117
Bulldog Electric Products Div., I-T-E Circuit Breaker Co. 35
Bussmann Mfg. Co. ..... Back Cover

C

Carol Cable Div., The Crescent Co. 1
Chase-Shawmut Co. 16
Chelsea Fan & Blower Co., Inc. 121
Classified Ads 134
Copperweld Steel Co. 99

D

Day-Brite Lighting, Inc. 52, 53
Duncan Electric Mfg. Co. 85

E

Electri-Flex Company 106
Electric Tubular Products 122
Electromode Div., Commercial Controls Corp. 115
Electro-Motive Div., General Motors Corp. 72, 73
Elgo Shutter & Mfg. Co. 138
Elliott Electric Mfg. Corp. 128
Erico Products, Inc. 103
Estimating Handbooks Associates 124
Evans Metal Company 2

F

Fanner Manufacturing Company 89
Fisher-Pierce Company 96
Fullman Manufacturing Co. 120

G

G & W Electric Specialty Co. 70
Gedney Electric Co. ..... Second Cover
General Electric Co., Apparatus Sales Div. (Meters) 67
General Electric Co., Circuit Protective Devices Dept. 33
General Electric Co., Large Lamp Dept. 55
Globe Company 2

H

Helwig Carbon Products, Inc. 132
Holan Corp. 66

J

Johns-Manville Corp., Transite Pipe Div. 57

K

Kaiser Aluminum & Chemical Corp. 4, 5
Kelek Company 127
Killark Electric Mfg. Co. 113
Knox Porcelain Company 123
Koenig Iron Works, Inc. 94, 95
Kuhlman Electric Company 87

L

L & P Lighting 31, 32
Laclede Steel Company 27

M

M & W Electric Mfg. Co. 129
Martin Stamping & Stove Co. 28
Mason Co., L. E. 29
Massey, Inc., A. H. 138
Meyer Machine, Inc. 14
Micro Balancing, Inc. 100
Miller Co. 7
Moloney Electric Co. 93

N

Noland Company, Inc. 30
Norris Thermador Corp., Thermador Electrical Mfg. Co. Div. 119

P

Paragon Electric Co. 128
Pass & Seymour, Inc. 125
Penn-Union Electrical Corp. 83
Precision Multiple Controls, Inc. 64, 65

R

R T & E Corporation 69
Rattan Mfg. Co. 118
Revere Electric Mfg. Co. 39
Royal Electric Corp. 111

S

Sangamo Electric Co. 97
Sorgel Electric Co. 24, 25
Southern States Equipment Corp. 71
Southwire Company 15
Square D Company ..... Third Cover, 105
Sta-Brite Fluorescent Mfg. Co. 106
Sylvania Electric Products, Inc., Lighting Div. 26

T

Thermador Electrical Mfg. Co. 119
Thomas & Betts Co. 34
Tomic Sales & Engineering Co. 109
Truck Equipment Company 98

V

Victor Specialties 130
Vulcan Electric Co. 126

W

Wadsworth Electric Mfg. Co. 132
Want Ads 134

Y

Youngstown Sheet & Tube Co. 8, 9

ONLY VISIBLE BLADES GIVE YOU SAFETY YOU CAN SEE!

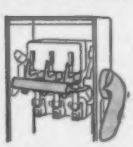
• The men who pull the switches will tell you what can happen when a switch, *believed* to be open —*isn't*. A lot of things can happen—and every one of them is bad. Personnel safety is in jeopardy. Motors can single-phase. Machinery and work can be damaged. Down-time can skyrocket.

Doesn't it make sense to insist on Visible Blade construction which gives you a road block against any of those possibilities? Doesn't it make equally good sense to insist on the safety switch which gives you that construction—plus a lot of other performance advantages? Evidently it does, because *Square D switches have never been out of first place in more than 50 years!*

They cost no more... why settle for less?

Extra Safety with Square D's Handle Design

WHEN IT'S **UP**
IT'S **ON!**



WHEN IT'S **DOWN**
IT'S **OFF!**

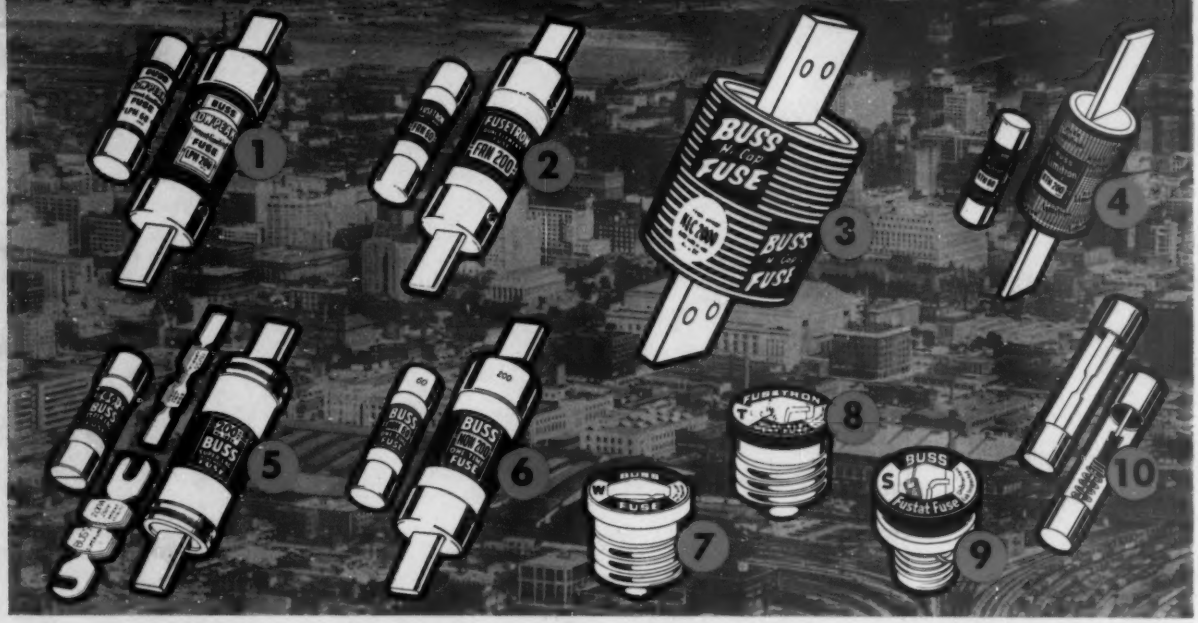
Handle is integral part of switch, not cover. When door is opened, handle remains attached to switch. Eliminates hazard of false handle indication or defeat of padlock provision. When it's padlocked, it's locked!

SQUARE D COMPANY

wherever electricity is distributed and controlled

FOR VOLTAGES OF 600 OR LESS

There's a *Safe and Dependable* BUSS Fuse or FUSETRON Fuse to fit the needs of every user . . .



. . . and fuses provide the highest degree of protection available.

They have no hinges or pivots, latches or contacts to stick or get out of order and possibly fail to function at the very moment when their operation means safety from serious fire and accidental hazards. No periodic inspections, recalibration and corresponding down-time is required. A fuse is just as safe and accurate 20 years or longer after installation as it is on the day installed.

1 **Buss LOW-PEAK fuses.** A great advancement in protective devices. Provide 200,000 amp. interrupting capacity . . . great current limitation . . . plus long time-lag to prevent needless shutdowns . . . at minimum cost. *Ask for Bulletin LPCS*

2 **FUSETRON dual-element fuses.** Have 100,000 amp. interrupting capacity. Eliminate needless blowing of circuit fuses. Protect motors against burnout from overloads or single phasing. Reduce heating in panels and switches. Give thermal protection to panels and switches. Save on service and maintenance costs. *Ask for Bulletin FIS*

3 **Buss Hi-Cap fuses.** For loads above 600 and up to 6,000 amps. Have 200,000 amp. interrupting capacity. High speed operation limits fault currents to safe values. Can be coordinated with FUSETRON or LOW-PEAK fuses to limit outage to circuit of origin. *Ask for Bulletin HCS*

4 **Buss LIMITRON fuses.** Extremely fast opening characteristics prevent heavy short-circuit currents building up under fault conditions. Can be coordinated with FUSETRON or LOW-PEAK fuses to limit outage to circuit of origin. *Ask for Bulletin HLS*

5 **Buss Super-Lag Renewable fuses.** Provide lowest cost protection where periodic short-circuits are expected. Give freedom from needless blows. Greatly reduce out-of-service-losses. *Ask for Bulletin RCS*

6 **Buss One-Time fuses.** Offer most economical protection for circuits where no motors are connected and possible fault current is not over 10,000 amps. *Ask for Bulletin NCS*

7 **Buss Clear Window Plug fuses.** One-piece body and "safety" design guarantee protection. Easy to spot blown fuse, even when light is poor. *Ask for Bulletin WUS*

8 **FUSETRON dual-element Plug fuses.** Safely reduce needless blowing of plug fuses and give full protection against short-circuits and overloads. *Ask for Bulletin TCPS*

9 **Buss FUSTAT fuses.** Have type "S" base which prevents overfuseing or tampering. Protect against short-circuits and overloads. Safely reduce needless blows. *Ask for Bulletin SCPS*

0 to 14 Ampere Buss FUSTAT fuses. Provide simple, low cost way to protect motors and apparatus against burnout on circuits of 125 volts or less. *Ask for Bulletin SMPS*

10 **BUSS and FUSETRON Small Dimension fuses.** Used to protect TV, Radio, Instrument, Radar, Avionic and Electronic Equipment. Complete fuse line includes dual-element "slow-blowing," single-element "quick-acting" and signal or visual indicating types, in sizes from 1/500 amp. up . . . plus a companion line of fuse clips, blocks and holders. *Ask for Bulletin SFB*

Play Safe! Install BUSS *Fuses or* FUSETRON *Fuses Now!* • Bussmann Mfg. Division, McGraw-Edison Co., St. Louis 7, Mo.